

MOTOR AGE

Vol. XXXI
No. 13

CHICAGO, MARCH 29, 1917

Ten cents a copy
Three dollars a year

JOHNSON'S PREPARED WAX NOW MADE IN LIQUID FORM

*Is the Finish of Your Car
Dirty, Grimy and Unsightly?*

YOU, yourself, can make it look almost like new and save the cost of re-varnishing. All you need is Johnson's Cleaner and Prepared Wax *Liquid*.

JOHNSON'S CLEANER

entirely removes all stains, discolorations, scum, road-oil and tar from body, hood and fenders. It doesn't injure or scratch the finest varnish—simply cleans and prepares it for the wax polish.

JOHNSON'S PREPARED WAX

We are now making Johnson's Prepared Wax in *Liquid* form so that it may be more easily polished. It is exactly the same as our Paste Wax except that it is in *Liquid* form. But very little rubbing is necessary. You can go over a good sized car in half-an-hour.

Absolutely Dust-Proof

Johnson's Prepared Wax Liquid gives a hard, dry, glass-like polish which does not collect or hold the dust. It preserves the varnish and protects it from the weather, adding years to its life and beauty. It covers up mars and scratches—prevents checking and cracking—sheds water—and prolongs the life of a "wash."

Tell your dealer that Johnson's Wax is now made in *Liquid* form and insist upon him securing it for you.

S. C. JOHNSON & SON, Dept. MA4, Racine, Wis.



*Apply with
Cloth—
Brush
or Spray*



Stewart PRODUCTS



Stewart
Motor Driven
Warning Signals



\$10
Stewart
Vacuum System



Warner
Auto-Meter \$50

Stewart
Tire Pump
\$12



Sell Motorists What They Want

That's the Easiest way to increase your sales.

Let the easy-to-sell lines earn profits for you.

That is how successful dealers operate.

They don't waste time trying to push unknown, unadvertised goods that motorists know nothing about.

Concentrate on one line—Stewart Products. And sell the entire line. Don't make the mistake of selecting one or two Stewart Products. Sell all of them—the Speedometer, Warning Signal, Tire Pump, Vacuum System, V-Ray Spark Plug, etc.

Motorists are sold on the full line of Stewart Products. Then, why shouldn't you cash in on the demand by selling the entire line.

Stewart Products is a growing line. New products are being added. Watch for two new whirlwind sellers to be announced in a few weeks.

Tie up with the growing, fast-selling, easy-to-sell line of Stewart Products.

"It will pay you to see that every car is Stewart-equipped."

Stewart-Warner Speedometer Corporation
CHICAGO, U. S. A.



\$3.50
Stewart
Hand Operated
Warning Signal



\$1
Stewart V-Ray
Spark Plug



Stewart
Speedometer \$25



Stewart Instrument
Board for Ford Cars
Complete

\$11.25

MOTOR AGE

Published Every Thursday by the
CLASS JOURNAL COMPANY
Mallers Building
CHICAGO ILLINOIS

Entered at Chicago as Second-Class Matter—Member of the Audit Bureau of Circulations—Copyright, 1917, by the Class Journal Co.

United States, Mexico and U. S. Possessions. One Year \$3.00
Canada One Year \$5.00

All Other Countries in Postal Union One Year \$6.00

BEWARE OF SUBSCRIPTION SOLICITORS OFFERING PREMIUMS OR CUT RATES—ALL CURRENCY SHOULD BE SENT BY REGISTERED MAIL.

RENEWALS or CHANGES OF ADDRESS should be sent two weeks in advance of date they are to go into effect. Be sure to send old as well as new address to avoid unnecessary delay. **RECEIPT** of first copy is acknowledgment of subscription.

Vol. XXXI

March 29, 1917

No. 13

Contents

WHEN THIS CIRCUS COMES TO TOWN.....	5
The story of the motorized organization recently effected	
DECORATION DAY RACE OFF.....	9
MOTORS IN WAR PLANS.....	10
EDITORIAL—DECORATION DAY RACING—WARDROBE TRUNK TOOL BOX—THE CRANKCASE LUBRICANT.....	12
DENVER SHOW THE FIRST IN TWO YEARS..	15
AMERICA'S STOCK OF ARMORED CARS.....	16
MOVING ITALIAN WOUNDED UNDER FIRE—Part II.....	18
MOTORS AND WOMEN IN OLD ENGLAND....	22
LAWS MAKE BETTER ROADS POSSIBLE.....	25
What some of the states are doing in their legislatures	
ELECTRICAL EQUIPMENT OF THE MOTOR CAR	30
MOTOR CAR DEVELOPMENT.....	36
Seagrave truck, National phaeton, Northern fire apparatus trailer, Lewis six-cylinder engine and new Ohio Electric model described and illustrated	

DEPARTMENTS

MOTOR CAR REPAIR SHOP.....	33
FROM THE WOMAN'S VIEWPOINT.....	40
ACCESSORY CORNER.....	46
FROM THE FOUR WINDS.....	48
AMONG THE MAKERS AND DEALERS.....	52

ANNOUNCEMENT

Next week—the annual touring issue, and a touring issue such as has never been published by a similar publication before. It is practical throughout and of such a nature throughout that the motorist well could make it his encyclopedia of touring possibilities.

The Logical Engine Driven Tire Pump

for your car because it is used by most of the better motor car makers as regular or special equipment on their cars.

KELLOGG Engine Driven Tire Pump

Can be installed on your car by your dealer and will save you from the annoyance of hand pumping and will reduce your tire expense.

KELLOGG MFG. CO.

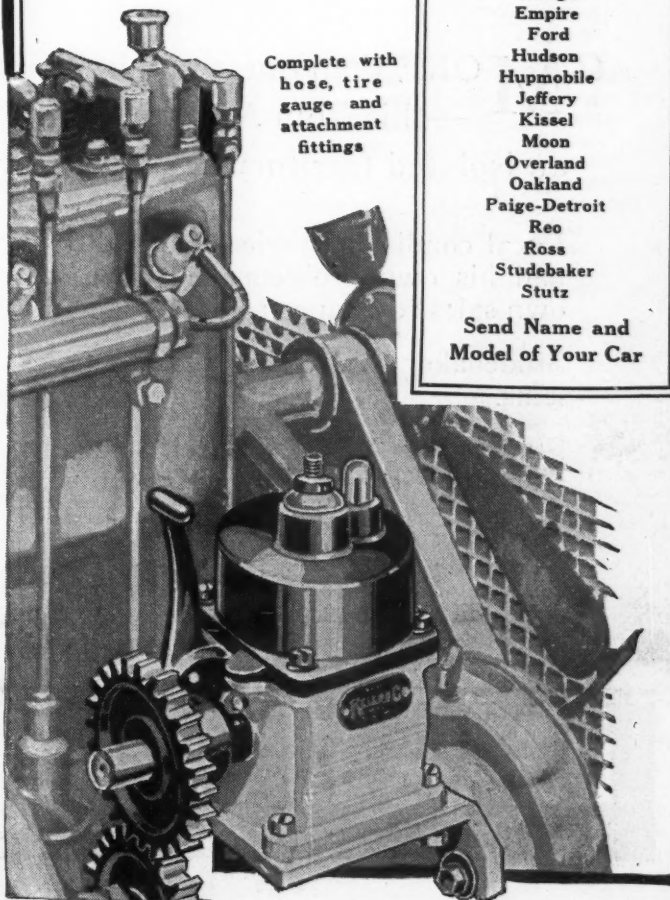
Rochester, N. Y.

Branches and Distributors in All Principal Cities

It Is Easy
To Attach
On These Cars
Any Many Others

Buick
Case
Chalmers
Chandler
Davis
Dodge
Empire
Ford
Hudson
Hupmobile
Jeffery
Kissel
Moon
Overland
Oakland
Paige-Detroit
Reo
Ross
Studebaker
Stutz

Send Name and
Model of Your Car



167.5% increase in Studebaker's 1916 sales in

Arizona

Arizona dealers say it's Studebaker Value

"**M**ORE than one and a half times as many sales this year as last"
—this from Arizona. That increase is for the entire state—not
an isolated territory or a specially chosen dealer.

Local conditions varied—each dealer
had his own problems to solve, his
own sales resistance to offset.

Studebaker VALUE solved the prob-
lems.

Studebaker VALUE overcame the
resistance opposed by his compet-
itors.

Result—167.5% increase in sales for
the state as a whole.

And Arizona is only ONE of the many
states reporting increased sales.

Taken all in all these increases go to
prove beyond the possibility of a
doubt, the truth of our repeated asser-
tion—"It pays to be a Studebaker
Dealer."

STUDEBAKER

South Bend, Ind.

Detroit, Mich.

Walkerville, Ont.

Address all correspondence to Detroit

It pays to be a *Studebaker* dealer



MOTOR AGE

When This Circus Comes To Town

by M. C. Horine

SOME 2693 years ago the first elephant paced back and forth at the end of a short chain hobble as mother and father who had come to bring the children to the circus admonished Johnny and Mary not to go too near or they might get stepped on. For it was in 776 B. C. that the circus business started, and the animals of the show alternated as ornaments and as beasts of burden used in transporting the circus to its next center of attraction.

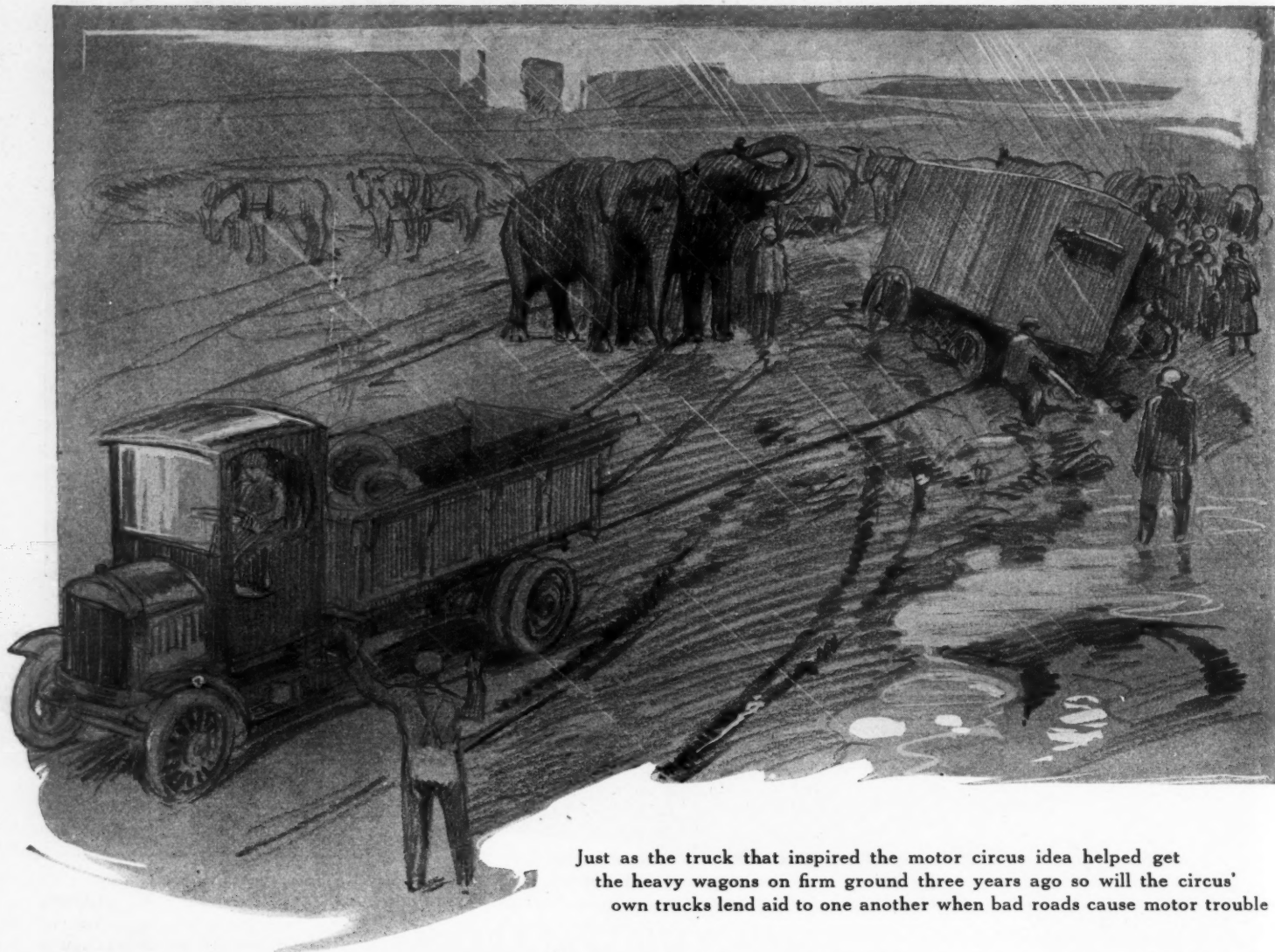
Only in the last fifty years has the road caravan that left the trampled saw-dust ring of the vacant lot failed to loom out-

side the windows in the gray dusk of early dawn as the circus left town. The railroad has been a confederate of the large circuses during these years, but even the railroads never entirely superseded the horses with their hoofs grown out of size through pulling heavy cages.

A new era has dawned, and the signal for its light was the purchase made by the United States Circus Corp. some weeks ago. No longer will the small boy slip his galluses over his shoulders and pelt helter-skelter down to the vacant lot to see the horses pull in and to see them "load her on" for departure. No longer will he lie awake half the night, fearful that the elephant will come or go while he is sleeping or that the side-tracked railroad cars will begin to unload before he can reach their neighborhood.

The truck is now the friend of the small boy, and so familiar is he with its manipulation and presence that he feels sure no circus could persuade such means of transportation to slip in on him unaware. Frank P. Spellman is the originator of the won-

"When that circus came to town, we were the first two on the ground—"



Just as the truck that inspired the motor circus idea helped get the heavy wagons on firm ground three years ago so will the circus' own trucks lend aid to one another when bad roads cause motor trouble

derful new transportation for monkeys and elephants and lions and things. He first thought of it three years ago, when he was running a twenty-four-car outfit on the old plan. The change came in the very presence of the small boys, as wide-eyed they watched the circus of the night before shrink into itself.

How the Idea Came

It was at a small town called Burton. The heavy wagons were no match for the mire of the field in which the circus had played the night before, and twenty-four horses and two elephants failed to pull one out. While the struggle was on a Bell telephone truck came along, and its driver offered to help. The truck pulled the wagon out sideways, and Spellman saw visions of a motor circus that no mire could vanquish. The driver spent the morning helping get the circus off the badly-bogged grounds, and Spellman paid him \$50 for the job.

The idea has grown in these three years since the circus showed at Burton that night. Spellman has since organized a \$1,000,000 company and is himself president and general manager. He doesn't attend to the mechanical end himself but engages the performers and crews and pur-

chases equipment and animals. A. Roy Knabenshue, one of America's pioneer aviators, is the engineer of the venture, which is to transport the \$150,000 Frank C. Bostock collection of trained animals Spellman obtained, together with the rest of the circus. Some of these animals, by the way, are in London; others are in Southern California in motion picture work, while others are at Coney Island and Luna Park.

When the circus begins its season this year, probably as early as next month, it will be equipped with Kelly-Springfield trucks and Troy trailers for its transportation facilities. The circus is to be a motor show in several ways. Special motor events are scheduled for the performances, and motor curiosities will be billed at the side-shows, perhaps. The parade is to be a traveling motor show, representative cars of all makes being included in its company. Manufacturers who have sold the circus some of its equipment are to co-operate in the publicity of the exhibition and have feature vehicles with the convoy and in the parade.

The Kelly-Springfield, which supplies 100 3½-ton chassis, is to send along a 3½-ton chassis equipped with a club car body to represent its house organ, "Like Kelly

Does." The Firestone Tire & Rubber Co., whose tires will be used exclusively, will have a float called "The Colossus of Roads," which will feature the Firestone Giant tires to be used on all trucks. The slogan of the circus will be "Good Roads," and highway commissioners will be invited to visit and accompany the circus.

New Type to Make Debut

Bode Bros., Cincinnati, Ohio, are building some floats for the parade. Several of the Kelly-Springfield chassis have been delivered, and the rest are to be delivered as fast as the body makers can do so. A new type of caterpillar tractor, the Kelly Snake, is to make its debut with the circus. It is much smaller than the farm type and is somewhat like the commercial tractor which will serve to pull any of the vehicles out of whatever mire they may encounter. A stake-driver which works automatically will be used. Formerly it took a crew of seventy men 3 hrs. to drive the tent stakes for a show the size of this one. Two little machines, each with a man and a boy, will drive 355 stakes in an hour. No labor other than the inserting of the stakes in the driving member will be necessary. A stake puller will have a crane attachment by which even the most stub-

born stakes can be pulled quickly and easily.

Handling the canvas is the biggest job in the circus, just as it is in the quartermaster's work of an army encampment. Reels mounted on trailers will lessen the labor involved, however, and the great sheets of canvas which go into the big top and smaller side tents will be wound and rewound by mechanical power as if they were window shades.

Since the motor plan of the circus has been announced there has been much discussion of it, and grave doubts have been expressed as to the ability of the show to travel on country roads and to get on and off the circus lots. Knabenshue has spent weeks on the Mexican border studying the methods of the United States army in the use of its 2300 or so trucks for this very reason. Since then he has been busy planning improvements and adaptations to the circus business.

Circus Trains Traffic Men

That the circus is no laggard in the army of transportation is evident from the employment of many of the old-timers by the armies in quartermaster work. Circus transportation always has been an exacting task, and if it is to be solved to a great extent by the use of trucks and trailers, it is not a bit too soon, considering that some twenty-six centuries have given the transportation men plenty of opportunity for hard work.

When one of the old circus men was attending to the transportation of the late Buffalo Bill's show in Germany, so he tells, officers from the German army watched his operations carefully for days. As for that matter, some of the managers of the highly-organized commercial truck fleets are graduates of circus experience.

The railroads have served the circus in transportation, but it has not been possible always to have the plans of the circus and the plans of the railroad agree. The plan of the United States Circus Corp. will have the advantage of being independent of all train schedules. It will, however, have a schedule of its own. This schedule will be adhered to according to military conduct. The discipline employed in its adherence will be scarcely less strict than in any army.

To Have Road Scouts

Advance men also will act as road scouts. The first car will start out forty days in advance of the circus proper, and its passengers, two men, will make definite arrangements in the towns along the route for a lot, permits and so on. They also will arrange a preliminary route, subject to change.

The main advance advertising crew will start out thirty days in advance. It will consist of twelve men and have three trucks and one passenger car. The second bill-posting crew of six men will travel twenty days in advance, while the main bill-posting outfit, consisting of twenty-

four men, will arrive, post all roads in a radius of 60 miles and report as to the conditions of all roads in the vicinity fourteen days in advance.

Four road scouts, riding on motorcycles, will travel four days ahead of the circus to check up on the information already received and to send back final reports of any work to be done to make the roads passable.

The road engineering outfit will be a day ahead. It will consist of twenty men and two foremen and will be equipped with four trucks and the Kelly Snake. One of the trucks will have a crane. Every available device for quick road-repairing, including means for strengthening bridges, building culverts and laying pontoon bridges across streams, will be carried. With this preparation of the roads and other ways to get the trucks into and out of the lots it is thought that the circus will be able to proceed without a hitch in the schedule.

The route will not be laid out until the pathfinding car has been on the road for some time and returns to give a report. In this way it will be possible to avoid the worst of the roads and to send out emergency crews to make repairs that cannot be handled by the regular road crews.

Next to the roads in importance is the mechanical condition of the trucks. The trucks will have to keep up with the procession or fail in their mission, and there is no prospect of their doing that. Provisions are to be provided as an assistance to the trucks and to help keep them in line, and hence no loitering is expected. A complete wrecking outfit will be carried. It will contain a machine shop truck similar to those used by the army in Mexico and will be in charge of expert factory mechanics.

The circus train will travel in two parts. The first will be a utilitarian unit; the second, the parade convoy. These in turn, will

be separated into divisions of ten trucks each. Seventy-six Troy trailers will be hauled by the trucks in the main body.

A superintendent will command each division. He will ride a motorcycle and will have full responsibility for the ten trucks, their trailers, loads and personnel. The manager of transportation will give his orders for movement by units to the superintendent of each. A fleet of Indian motorcycles has been purchased for the superintendents and road scouts.

Each division is to operate independently of the other, the trucks keeping a uniform distance of 15, 20 or 25 ft. apart, as ordered. The superintendent on his motorcycle will be able to ride up and down the line and see that this distance is kept or ride back and ahead to the wrecking crew in the case of accident to any truck of his division.

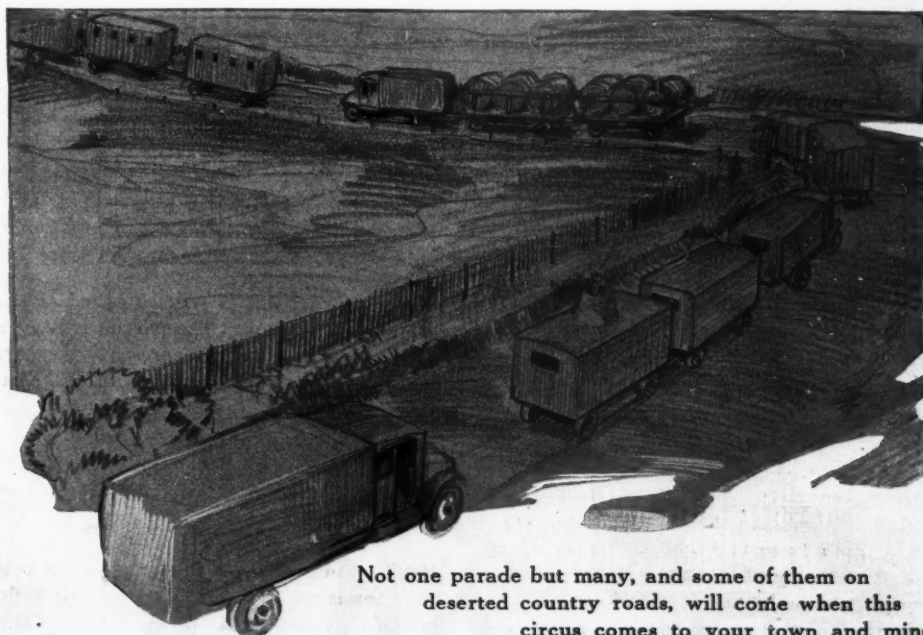
Drivers Will Be Examined

The trucks will be governed to 10 m.p.h. and will have experienced drivers who have passed an examination. The drivers will work 8 hrs. a day and receive \$3 a day pay seven days a week, in addition to board. These men will be required to do nothing but drive and care for their trucks.

The corporation has received applications from two or three hundred college men from a score of schools, from employees in the plants of the concerns from whom vehicles are being bought and from individuals. If one can judge from that, the small boy will still have attractions to run away from home to join the circus.

Each truck has a cab quite separate from the rest of the body, regardless of the nature of its load. This cab has a seat more than 6 ft. wide with a back which lets down to form a bed for the driver at night. Lockers will carry the driver's personal possessions, and his cab is to be his home during his employment.

The rest of the employees will sleep in



Not one parade but many, and some of them on deserted country roads, will come when this circus comes to your town and mine

special bodies mounted on trailers. The officers and performers will have Pullman car bodies for sleeping apartments. The hands will have bunk, or caboose, cars. Other trailers will carry cages and stalls for the horses. Six horses will be carried to a trailer; four camels, two small elephants, and one large elephant.

Since time immemorial circus day has started its regular program with the morning parade at 10 or 11 o'clock, though for the small boy it has started much sooner. It has ended with the grand pageant in the Big Top shortly before midnight. Between days the members of the outfit have slept 8 hrs. or traveled to the next town. This motor circus will make jumps averaging about 35 miles, none farther than 50 miles, except over Sunday. And further, Spellman is not content with the old 11-o'clock parade. He is determined to make the jaunt from town to town a parade and by advertising to see to it that the audience takes rail seats all along the route, so that he may pass in dignity.

Trips of 5 Hrs.

A truck is expected to take 5 hrs. usually for the trip to the next town. This will permit starting as late as 5 o'clock in the morning and arriving in time for the parade to start between 10.30 and 11. The performers can sleep 10 hrs. if they wish, though the last 5 hrs. will be taken en route probably, if they travel at night, especially.

Each member of the company is expected to eat his last meal at 5 o'clock in the afternoon. Half an hour later the culinary division will be on the road for the next town, picking up needed supplies as it leaves. It will reach the site of the next show between 10 and 11 p. m. so that the crew may have a good rest before getting breakfast for the earliest of the other divisions.

The whole circus will be going full blast at 8.30 at night. By 9 the public will have abandoned the side shows for the Big Top, and the smaller tents can be struck and started on the road. The menagerie tent also can be sent on ahead, as has been done in these truckless years. As each act finishes its turn the traps, equipment, costumes and animals belonging to it will be packed and loaded. Then, when the grand finale has ended, the Big Top itself, the equipment of the main acts and the seats only will remain to be loaded, and the public will emerge to a vacant, wind-swept stretch of torn papers and trampled earth—the circus will be over. By midnight the entire circus will be gone.

The last division to leave will reach the next lot between 3 and 5 o'clock in

the morning, if it leaves immediately after the final performance. It may stay on the old lot or at the roadside until then and make the run into the new town by daylight.

So far the daylight method is preferred. If longer jumps must be made the schedule will be arranged so that these can be made over Sunday. The parade will be made up at the new grounds each day, the daylight ride being in addition to the old parade. What a future for the small boy? He'll surely like the trucks, for two parades beats getting up at 4 to see only darkness, though you can hear horses.

An Engine Accompanist

Imagine the ornate, gilt-bedecked band chariot with a so-many-horsepower engine giving purring accompaniment to the flare of trombones and the beat of the big bass drum! Or a lion pacing back and forth as if it were at all possible for him to be more powerful than the motive power that bears his cage in the parade!

From city to city and from town to town truck and its cargo will offer very little inducement compared to what it will offer in its daily parade. For canvas is to cover each truck and keep its wonders in concentrated form for better time. Only in the parade are the circus fans to see the gilt and red and beasts and clowns in full war paint, according to present plans.

Altogether, there will be 130 trucks, and these will range in capacity from 2 to 3 tons in weight, giving a total capacity equivalent to a 65-car show. All properties, including the advance, will be transported from place to place by these trucks. It is estimated that the 130 trucks will cost somewhere around a half million dollars. Some of them will be service trucks proper, though they will be decorated also to make the parade more impressive. Some of the trucks, or cars as they more likely will be called in circus talk, will be special cars, built solely for display, things of beauty and joys forever, so to speak. Each will be able to accommodate twenty persons on occasion.

The show is to open probably at Newark, N. J., and will go from there through New England, back across up-state New York, Pennsylvania, Ohio and the Middle West, circling back later in the season. The corporation has been organized a year and is capitalized fully, the stockholders being located over the territory which is to be covered by the circus.

The whole policy of the new concern is one of co-operation rather than exploitation. The circus will be a motor show throughout, special motor events being scheduled in the performances and motor

curiosities in the side shows perhaps. The parade will be a traveling motor show, representative cars of all makes being included in it. Manufacturers of the equipment have agreed to co-operate in the publicity for the exhibition, as mentioned in preceding paragraphs, and will have their own feature vehicles with the convoy and in the parade.

Meanwhile, the work of getting the great organization ready for the road goes on. At the offices in New York the executive force is as busy as any small boy ever was carrying water for the horses. And, by the way, do not get the idea that no longer can the small boy earn his way into the Big Top by the sweat of his brow. For there will be the performing horses to demand more water, and even the trucks may permit a few gallons to be brought to them.

But there will be a difference to the lay public in this way. They will miss the over-burdened horse of the big, shaggy hoofs, who after hauling the great drays of canvas, stakes, tent poles and other equipment from the sidetracks must needs arch its neck at the command of the checkrein in the parade. The motor truck with its immense, naturally giant-like tires will have taken its place, and there will be no sidetrack for the motorized circus.

Entrance and Departure

Do you remember watching the agile acrobat of the night before grudgingly climb into the horse-drawn vehicle, which was a cross, more or less, between a patent medicine vender's van and a railroad bus, and perch precariously on a hard seat while he and his family, other members of the acrobatic troupe, were hauled laboriously out of town? That was without the benefit of railroad, of course, and on the schedule made by circus managers, but what a different transportation from the truck of this circus!

The acrobat will enter a motor vehicle constructed after the plan of a Pullman car, with sleeping compartments that make up into day coaches, in a way. He and his companions will have all the comforts of Pullman accommodations with no trip to the railroad tracks. And the departure from the circus lot will be swift, sure and confident of a good passage to the next stopping place.

"When that circus came to town, we were the first two on the ground," or so we're told the old song goes. And when this circus comes to town, such will its superior charms be, what reason is there to think that the old song will not still be new for the small boy and his pal?



Decoration Day Race Off

Strongest Supporter of Motor Car Contests Out for Season at Least

Indianapolis Thinks Speedway Events Out of Order

CHICAGO, March 26—The decision of the Indianapolis speedway not to hold any motor car races this year and the calling off of its Decoration Day 500-mile race scheduled for May 30, as announced by James A. Allison, means that the strongest supporter of racing in the country is out of the sport for this year and perhaps longer, in case war continues. The Indianapolis speedway has called off its entire racing program solely because its owners do not believe that there should be professional sport, such as motor car racing, with the country in a state of war. Mr. Allison believes in amateur sports during war time but not professional sport.

While Indianapolis speedway has declared itself out of racing this year, it is not going to place any barrier in the way of other speedways, and as a result its team of racing cars is for sale. The Prest-O-Lite racing team, owned by Mr. Allison, consists of two Peugeots and three Premier cars. All are for sale, with the exception of John Aitken's Peugeot, which is being locked up for the year.

The racing drivers of the Indianapolis team are free to make whatever arrangements they may want to.

Offers Factory to U. S.

The racing factory, built near the speedway, in which Mr. Allison was going to build racing cars and parts, and which factory, measuring 140 by 80 ft., is well fitted with lathes, milling machines, grinders and all other kinds of necessary machinery, has been offered to the government to use as it sees fit. Besides this, the entire Indianapolis speedway, with its 2½-mile brick track, has been offered to the government so that it can be used as an aviation field or for any other purpose desired.

It is doubtful what influence the withdrawal of Indianapolis from speedway racing will have on other speedways. As soon as Indianapolis' decision to withdraw was known, the Chicago speedway and also Cincinnati speedway applied to the American Automobile Association contest board, New York, for sanctions for a Decoration Day race. It is expected that the contest board will oppose such a plan and rule that Decoration Day should not be given any speedway sanction. There is a strong feeling that this day belongs to the soldiers, and in case of war the sentiment would naturally be stronger.

David F. Reid, president of the Chicago Speedway Association, expects that the racing program on his speedway will be carried out as usual this year. Manager

Reid has wired the Secretary of War, offering him the use of the Chicago speedway for military purposes should necessity arise. It is certain that many of the speedways would be very suitable for military purposes. At the outbreak of the European war the premier speedway of the world, the cement Brooklands track, was turned over as a testing ground for aviation and motor truck works and has been utilized as such up to the present.

So far as the other speedways are concerned nothing has been received that would indicate that they are out of racing for this year. Cincinnati has requested a Decoration Day date. New York speedway, known as Sheepshead Bay, is in financial difficulties but promises to get cleared away soon.

The Cincinnati Speedway Co. expects to run its races of June 23 and Sept. 4, as scheduled some months ago, but H. S. Lehman, president, states the speedway will be turned over to the government if it can be used by it in any way. This speedway was built by the citizens of Cincinnati, much as a municipal enterprise. It cost \$700,000, and every dollar has been paid.

No Action on Speedway Offer

Washington, D. C., March 26—Special telegram—No action has been taken by the war department on the offer of the Indianapolis Speedway to turn the speedway and the racing car plant over to the government for use in making and repairing airplanes and for an aviation training station. While such an offer may have reached the war department, it has not yet been sent to the aviation section. Experts of the aviation section believe that Indianapolis is admirably located for an airplane station, either as a training station for aviators or for the making and repairing of airplanes. Location of the speedway near Fort Benjamin Harrison, one of the biggest and most modern of army posts, and its proximity to Indianapolis, a motor manufacturing center, where supplies would be easy to get, makes the speedway an ideal location.

300 Racers Respond to Call for Service

NEW YORK, March 27—Special telegram—Over 300 racing drivers registered with the A.A.A. Contest Board have signified their availability for military services in case of war. Of these approximately half have signified that they would prefer the aviation corps and the other 50 per cent motor car service. The present vote is the result of a letter mailed Feb. 19 by Richard Kennerdell, chairman of the contest board, to all registered drivers and registered mechanics. Chairman Kennerdell drew attention to the necessity for preparation to join the United States service in the event of war and inclosed a blank to be filled out, signifying which service was preferred.

Racers' Squad Planned

Rickenbacher and Aviation Captain Consider Aerial Formation of Drivers

Twenty-two Have Been Invited to Enlist

NEW YORK, March 26—Formation of an aerial squadron, to be composed of prominent motor car race drivers and their mechanics, was considered at yesterday's conference between Captain W. G. Kilner, commanding the aviation field at Hempstead Plains, and E. V. Rickenbacher. Under the plans proposed the squadron would be composed of twelve airplanes and 133 men. Twenty-two drivers and their mechanics have been invited to enlist. If the squadron is formed it probably will be trained at Indianapolis, Ind., Detroit, or New York.

Representatives of the Advisory Committee on Aeronautics, which is co-operating with Rear Admiral Usher of the Third Naval District, have just returned from Washington, where they conferred regarding a great aeronautic station in this city.

With twenty-five of the leading racing drivers banded together as airplane pilots, it is to be expected that the government will get better service than if these men were in different sections of the country. Rickenbacher so far has received affirmative replies from Henderson, Chandler, Disbrow, Gregory Flinn of the Rajah Co. and Ralph dePalma.

It is understood that Eddie Pullen, the Mercer pilot, is organizing the racing men on the Coast.

GETS DIRIGIBLE CONTRACT

Akron, Ohio, March 24—The Goodyear Tire & Rubber Co. has been commissioned by the Navy Department to make and demonstrate nine of the sixteen dirigibles authorized for use in coast and harbor defense. For several years the Goodyear company has been interested in aeronautics and has furnished spherical balloons for training purposes, as well as kite balloons for military observations. The coast patrol dirigibles which are being built are of the non-rigid type, that is, without interior framework, and are designed to operate from shore bases.

The dirigible envelopes, or gas bags, twelve of which are being made at the Goodyear factory, are 160 ft. long and 31½ ft. at the maximum diameter. The gross lift is 5275 lbs. under normal conditions, and the engines are to be 100 hp., of the Curtiss type.

The dirigibles will carry two men, the pilot and an observer, and will be equipped with radio communication. It is expected that a speed of 45 m.p.h. may be maintained for 10 hrs. In ordinary cruising the

dirigibles are designed to operate at about 35 m.p.h. and at such speeds will carry enough fuel and ballast to operate continuously for 16 hrs. at heights varying from a few feet from the ground to a maximum altitude of 7500 ft.

Delivery is to be made about Aug. 1. In addition, several kite balloons for military observations; spherical balloons for training purposes; and other dirigibles, with airplane tires and other rubber accessories for airplanes, are being constructed at the Goodyear factory.

BABCOCK GETS GOVERNMENT ORDER

Watertown, N. Y., March 23—The H. H. Babcock Co., Watertown, N. Y., has closed a contract with the Government to furnish 500 ambulance bodies to be used on motor truck chassis by the medical corps. The contract calls for delivery within six months. The sample body on which the order is based has been approved by the medical board. It was in operation in Washington for more than a month before the order was placed. The contract is said to represent about \$150,000. The company will run its plant at full capacity to fill it and hopes to be able to make delivery before the six months are up.

HOOSIERS TALK WAR

Indianapolis, Ind., March 24—The function of motor car engineers in war time will be one of the subjects of the March 30 meeting of the Indiana section S. A. E. This will be discussed by F. E. Moskovics of Nordyke & Marmon and a member of the council of the S. A. E. Other papers will be presented by Ferdinand Jehle, service engineer of the Aluminum Castings Co., on problems of aluminum engine construction. Mr. Nelson of the engineering department of the Premier Co. will touch on the peculiarities of camshaft design for aluminum overhead engines, and Albert Champion, vice-president Champion Ignition Co., will tell about spark plugs' limitation in high-speed engines.

MACHINE GUN CARS ARE TESTED

Detroit, March 23—Cars are being tried and tested these days to determine which are more fitted to meet the needs and requirements of the Government, and during one of these tests one of the new Studebaker machine gun cars maintained a speed of 25 m.p.h. over the 250 miles between El Paso, Tex., and Deming, N. M. The first part of the trip from El Paso, Tex., is over fairly good roads, but from Mesilla Park, N. M., to Deming, N. M., there are 70 miles of desert sea and a slope up to 8000 ft. above sea level at Deming, N. M.

Each car contains two machine guns and their equipment, 20,000 rounds of ammunition, tools, water, gas and oil, field rations and seven passengers beside the driver, a total weight of 2½ tons.

Motors in War Plans

Council of National Defense Considers Aid Available from Plants of Industry

No Factories Have Been Taken Over Yet

WASHINGTON, March 26—Within a few days the United States, in all probability, will have been declared by Congress to be in a state of war with Germany, though such formal declaration will result in little change in plans by the government from those already made, due to the fact that in anticipation of such action the United States is to-day financially, commercially and industrially prepared to the extent that this is possible. The Council of National Defense, which has been working for more than a year with the heads of the war and navy departments, has seen to it that business has done its part.

The exact situation is that up to this hour the Government has taken over no factories of any kind, but it is ready to do so at a moment's notice, that munitions, trucks, airplanes, motor boats, commercial and passenger cars, accessories, wagons and hundreds of other articles necessary to the common defense may be made immediately available.

Skilled Labor Mobilization

Possibility of the mobilization of skilled labor in munitions, motor car and other manufacturing institutions almost at a moment's notice will mean that the United States will have profited by the oversight of England in this connection. The cabinet has just had under discussion this keeping of the country's supply of skilled labor mobile and ready for any emergency, and the subcommittee of the Council of National Defense on manufactures, headed by Howard E. Coffin of Detroit, has practically completed plans for supplying artisans to the munitions plants in any number necessary to operate those owned by the government or privately owned, also, for the conversion of manufacturing plants best fitted for the making of munitions, such as motor car plants and others, the usual character of construction of which would make them most adaptable with a minimum of effort to the making of munitions.

While insisting that the policy of the country must be finally decided upon by Congress, Secretary of War Baker, in discussing the present situation said, in part:

"All that you can say of the War Department is that it is pressing ahead all purchases of everything that will be needed to equip an army, if the army is to be called upon."

This statement of Secretary Baker doubtless means that great numbers of passenger cars, trucks, accessories, etc., will be needed and will be bought, if the actual purchases have not already been

authorized. One plan of the government is said to be to equip an army of 500,000 volunteers. If this is done it would more than double the demands for motor cars, trucks and other cars, as the present regular army and the National Guard forces of the country combined represent but about 300,000 men. Transportation, not only as between distant points but in connection with the daily movements of units of the army, will be one of the most important features to which attention will be given, and this means that great numbers of trucks will be necessary.

No Trucks Ordered

Washington, D. C., March 26—Col. Chauncey B. Baker of the quartermaster's corps of the army states that the war department has not given orders for the purchase of additional motor trucks for the army. The last purchase of trucks made was for the Pershing expedition and for the troops along the Mexican border. Army officers are not inclined to discuss prospective purchases of motor trucks or other supplies until an order is ready to be given. The Council of National Defense has, however, matters in such fine shape that the purchase of trucks, when needed, and other motor supplies could be made promptly and satisfactorily.

FAGEOL HALTS ORDERS

Oakland, Cal., March 24—The Hall-Scott Motor Car Co., maker of the Hall-Scott aviation engine, which is being used in the new Fageol car, has received an urgent request from the War Department to use every effort to furnish all available aviation engines for the next six months. The Fageol Motor Co. has agreed to allow the Hall-Scott Motor Co. to use its allotment for this period to help in filling the demands of the Government. Consequently, the Fageol Motor Co. will accept no further orders for cars until the present needs of the war department have been filled and engines again can be obtained from the Hall-Scott Motor Car Co.

SCHOOL FOR PREPAREDNESS

Detroit, March 26—The Michigan State Auto School has offered its buildings, equipment and services of fifteen instructors for the use of army officers who may wish the specialized training in motors, trucks, etc. The school has also offered to assist the government in getting in touch with truck drivers, candidates for the airplane corps, operators of submarine chasers and others wanted for specialized positions. A. G. Zeller, president of the school, has written the Government offering the list of the 4200 graduates of the school.

RULING AFFECTS SPEEDWAY

New York, March 26—A new stage was reached in the financial difficulties of the Sheepshead Bay 2-mile motor speedway on Long Island when the Supreme Court

in Brooklyn handed down a decision today ruling that the Sheepshead Bay Speedway Corp. is indebted to the Coney Island Jockey Club to the amount of \$2,135,161.86 and granted to the club a judgment of foreclosure on the corporation's exhibition grounds at the old Sheepshead race track.

The Sheepshead Bay Speedway Corp. has at present a committee working along the line of financial reorganization, and it is expected that the speedway will be continued as it has in the past. The sentiment is strong that New York can support a speedway. Contests up to the present have not been a financial success, due to the very heavy overhead charges. When the speedway was built there was not sufficient money subscribed to meet construction obligations, and ever since the first meet there has been a heavy debt.

HAS A. A. A. REPRESENTATIVE

Chicago, March 24—Prominence of Chicago as a contest center is emphasized by the appointment this week of a special representative of the American Automobile Association contest board for this city. Chicago is the first city to have a special representative. L. R. Hillman, local branch manager of the Hess-Bright Bearing Co., will serve in this capacity. In addition to being the general contest board representative in this city, Hillman also is the technical representative of the A. A. A. for the middle western territory, and it is the large number of sanctioned tests in this territory in addition to the speedway events that has made a special representative necessary.

INCORPORATES FOR \$6,000,000

Kalamazoo, Mich., March 23—The States Motor Car Co. has been refinanced for \$6,000,000 by Thomas B. Nevin & Son, B. F. Yoakum, and associated New York capitalists. The new concern, which includes both the States Motor Car Co. and the States Motor Car Mfg. Co., has been incorporated in Delaware and will make a four to sell for less than \$900 and a six to sell for less than \$1,200. It plans to manufacture 6000 cars during 1917.

TAKES BRUNSWICK TIRE SALES

Chicago, March 26—J. W. Maguire has been appointed general sales manager of the rubber department of the Brunswick, Balke, Collender Co., main office in this city. This company entered the tire business in January of this year when its new factory at Muskegon, Mich., was opened. Since then this factory has been producing 500 casings and tubes a day. Plans are under way to extend the manufacture to truck tires of all kinds, rubber belting and other rubber lines. At present sales are being carried on through the fifty-six branches of the company, but Mr. Maguire expects to start establishing agencies and build up a broader sales organization.

Houk Interests Merged

Wire Wheel Corporation of America Takes Over Pioneer's Patent Rights

Deal Clears Complex Situation That Threatened Litigation

NEW YORK, March 26—The wire wheel patent situation in the United States has been clarified by the acquisition by the Wire Wheel Corporation of America of patents covering wire wheel manufacture. The culminating step in negotiations was the sale of the Houk Mfg. Co. and George W. Houk Co., its sales organization, to the Wire Wheel Corp., which took place last week. Mr. Houk retains an active interest, becoming vice-president of the Wire Wheel Corp.

Besides entire American rights of Rudge-Whitworth patents the Wire Wheel Corp. has acquired Dunlap, Cowles, House and Houk patents, the entire group covering every phase of wire wheel construction, according to advice of prominent patent attorneys. Negotiations are now under way with other wire wheel makers with a view to issuing licenses.

The Wire Wheel Corp. was formed with \$2,000,000 capital by a syndicate in which Bertron, Griscom & Co. and Jamieson, Houston & Graham, Inc., were active. John F. Alvord, president of the Standard Co., Torrington, Conn., Splitdorf Electrical Co., and Hendee Mfg. Co., heads the new concern with George W. Houk and R. E. Griscom as vice-presidents and S. A. Falkenstock, secretary and treasurer. The East Springfield plant of the Hendee Mfg. Co., covering 10½ acres and 175,000 ft. of manufacturing floor space has been acquired and will produce wire wheels for high-priced cars and also develop wheels for low-priced cars. The Houk plant at Buffalo will be enlarged by 100,000 sq. ft. and the production of Houk wheels will be greatly increased. The Houk output gained 300 per cent in 1916 of 1915 and in 1917 to date is running 400 per cent ahead of 1916. The executive committee of the Wire Wheel Corp. is J. F. Alvord, R. E. Graham and R. E. Griscom. Among the directors are these: Marshall J. Dodge of Bertron, Griscom & Co., and Jacob Bretz, Bearing Co. of America.

The Wire Wheel Corp. has ample funds and expects that wire wheel market will expand to a marked degree to its ability to produce in large quantities without fear of patent litigation.

DEPPE TO BUILD CARS

New York, March 27—Special telegram—The Deppe Motors Corp., a new organization very strongly backed financially and controlling patents regarding using heavy fuels in engines, promises to take an im-

portant part in such industries as motor truck, farm tractor, airplane and motor car. This company recently offered 100,000 shares of stock to the public, has already 500,000 shares, par value \$10, underwritten and is planning to build passenger cars embodying its device, that is, the fuel vaporizer, and other inventions covered by Deppe patents. In addition, the Deppe corporation intends to take stock interest in established concerns manufacturing engines for trucks, tractors, cars and airplanes, where these companies will incorporate the Deppe invention in their products on a royalty basis.

Recent tests of the Deppe generator shows that it works very satisfactorily. The generator, by using a small part of the engine exhaust gases, makes super-heated gas of fuel oils.

Property of the Deppe corporation consists of \$1,500,000 in cash and its patents, four of which have been granted already, and a number of others are pending. The Deppe corporation was organized early this year to manufacture Deppe super-heated gas generators and engines under various patents now held by W. P. Deppe of this city.

UNDERGROUND GARAGE PLANNED

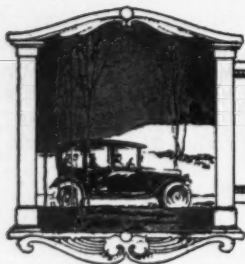
Chicago, March 26—In view of the problem motorists will face when the new downtown anti-parking ordinance goes into effect, there has been a distinct revival of the project for an underground public garage in Grant Park, which is on the lake front just off the congested district. W. O. Duntley, president of the Chicago Pneumatic Tool Co., is one of the strong supporters of the plan, as is Judge Sabath, formerly of the speeder's court. A definite location of an area, large enough to take care of all machines used downtown for years to come, has been pointed out.

WRIGHT AIRPLANE PLANT SOLD

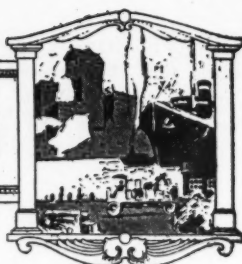
Dayton, Ohio, March 27—The plant of the Wright-Martin Aeroplane Co. has been sold to the Darling Motor Co., a new concern which will use it for the manufacture of motor cars. The Wright-Martin Co. is moving its equipment to its plant in New York.

Work on dismantling the Wright-Martin machinery is in progress, and it is expected that deliveries on the Darling car will begin within the next 60 days.

The new car, which is the design of James Guthrie has a single chassis type but several body styles. These are straight-line effect with double cowl. The chassis comprises a 3½ by 5¼ model 7-H Continental six engine, Timken axles, spiral-bevel drive, Borg & Beck disk clutch, Stromberg carbureter, Bijur starting and lighting, Kellogg tire pump, Atwater Kent ignition, Stewart vacuum feed and Moto-Meter, Conaphore lenses, demountable wire wheels and other features of equal grade.



EDITORIAL PERSPECTIVES



Decoration Day Racing

THE Indianapolis speedway has spoken early and definitely as to modifications in its racing program for this year because of the war. We agree with them in that if our country is in war and it is impossible to see otherwise, then there should not be any motor racing on Decoration Day. Decoration Day belongs to the soldiers, and if war is on at that time the day unquestionably would be given over to more patriotic matters. We do not see why a Decoration Day speedway race should be held on any speedway this year.

OUR speedways can in most cases be utilized for military uses. For example, Brooklands speedway in England has been used as an aviation field and also as a motor truck testing ground. Our speedways may be used in similar ways, or if not, they would prove admirable places for military pageants for such times as Decoration Day, July 4, etc. Our racing drivers may be needed very much for staff cars, as they were in France in July, 1914. At any rate there is reason why Decoration Day should see no races.

Wardrobe Trunk Tool Box

THERE is no rational reason why the tool box on your motor car should be such a disorganized receptacle. It is worse than the coat pockets of an impossible business man and immeasurably worse than the hand purse of a woman. The majority of tool boxes are simply impossible spaces into which everything goes promiscuously. This is exactly what a tool box should not be. A tool box should be the final word in organization, in order, in convenience, in neatness and in accessibility.

THE multiple tool box is what is needed. The tool box with a little design to it and bearing a few resemblances to a wardrobe trunk in that there has been an attempt to have a special place for a few things. The multiple tool box might bear a little resemblance to the uptodate hotel dresser drawer which has special compartments for shirts, for collars, for handkerchiefs and in a top drawer has compartments for milady's jewels, gloves, etc.

IT boils down to our asking for a sensible tool box. Make it so that the top and perhaps the front side are hinged. The box proper might consist of a series of drawers; there can be three or four of them. One of these should have compartments for extra headlight bulbs, spare spark plugs and other spares

that should be handled with care. Another drawer should be given up entirely to an orderly arrangement of tools, pliers, wrenches, screw drivers, hammers, files and the other dozen of little tools that are needed around a car when the owner drives it. Lastly you can have a space or a compartment for miscellaneous parts, waste and other things. We do not attempt to analyze into the final details everything that should be had in this wardrobe box but rather to draw attention to the real need for such and to briefly outline a possible scheme to follow.

WE are not in favor of carrying tire tools in the same space with other tools. Give them a separate space. Tire tools are bulky and often dirty. When you need them you should not have to interfere with the regular arrangement of your regular tool box. Tire tools should be carried in a most convenient place. When you want them you want them in a hurry. You are always behind your touring schedule when you need them and so the more reason to have them in a super-convenient place. With them you may require a special hammer and wrench as well as jack, tire pump and perhaps tire tool and chalk. Keep them in one place. You will find it better for your patience and also better for the other tools which should be kept as bright and clean as knives and forks for the dinner table.

The Crankcase Lubricant

ONE engineer who has been making distillation tests of lubricant taken from the crankcases of motor cars and motor trucks has discovered that 45 per cent of the supposed oil in the crankcase has been nothing more or less than gasoline and that not more than 37 per cent of the crankcase contents is really oil suitable for the pistons and rings. This situation presents a serious condition of affairs. The test figures cannot be denied; in fact, they were checked by a government chemist to make sure that there was such a quantity of gasoline getting into the crankcase oil. As a result of this it becomes necessary to change the oil in motor cars and motor trucks much more frequently than formerly.

THE trouble for this condition must not be laid up to the fuel makers, for they are doing everything in their power to give us a good satisfactory motor fuel. They can give higher gravity fuels, but if they do the amount of gasoline that you can get from a gallon of crude oil will be cut down considerably, and naturally the price will go up. The gasoline makers have for years worked on the theory that it will be necessary to lower the gravity but at the same time put into the gasoline sufficient highly volatile contents as to make it possible to take up the

spark for ignition and starting. Lately we are facing more fuel trouble, particularly in the cold weather. To add to this are other difficulties such as possibly greater leaking of fuel into the crank-case due to more loosely fitting aluminum alloy pistons.

THE solution does not lie along any particular line. We cannot say to the fuel maker "Give us a better fuel so that none of it will condense and leak past the piston rings into the crankcase." We could not get enough of such fuel. We cannot say to the carbureter makers "You must immediately give a carbureter that will make such condensation impossible." If the carbureter maker would give us enough heat perhaps to handle the fuel as it should be handled, then the volumetric efficiency of the engine would be cut down and horsepower reduced. If we said to the makers of engines that reciprocating parts must fit so tightly that leaking past the piston must cease we would meet with troubles.

IN the meantime it is best for the car owner and the truck owner to change the oil as recommended. It may sound a little costly and prove a little troublesome, but for today it is the best and the cheapest method.

Motoring Possibilities

Motor Age's Practical Touring Issue

NEXT WEEK Motor Age's annual touring issue appears. This issue has been called The Practical Touring Issue. It will contain, we state conservatively, more practical common-sense touring information for the car owner than any single issue of any other similar publication ever published.

* * *

IT WILL be in every sense a national touring issue—not a touring issue for the people who live in large cities, Chicago, Kansas City, St. Louis, Milwaukee, New York, Boston and a few others, but a practical touring issue for the motorist in Mattoon, Ill., in Salina, Kan., or in Guthrie, Okla.

* * *

FOLLOWING its custom of the last two years, Motor Age will have a large supplement map showing national highways in colors. This map will contain many additional highways as compared with last year. Several thousand letters have been written to out-of-the-way places, getting road information from the people who live in such sections. This has been incorporated in the map, making it, we think, one of the finest touring maps of the country that has ever been published.

* * *

THESE are days when with the war cloud hanging over us a greater national importance attaches to all maps of this caliber. These are days when the motor truck and the car are dominating factors in case of hostilities. Europe spent on an average of \$12.50 a soldier for guns and ammunition for him, but she has spent more than \$25 a soldier for motor trucks. It may be that America will have to spend as much as \$75 a soldier for motor trucks when we find ourselves in military difficulties and with large problems on our hands. Roads are the great essentials at such times.

* * *

IN ADDITION to this large map there will be sixteen full pages of maps showing different sections of the country with all their leading motor roads. These maps will be in colors, with the main roads specially conspicuous. With these section maps before him the reader, whether he lives in Texas, Maine, Georgia or Nevada, can lay out routes in his home territory, as well as routes to any other part of the country. The motorist who wishes to plan a holiday of two, three or

four days over such holiday seasons as Decoration Day, July 4 or Labor Day can, with the aid of these maps, make such plans. With the aid of these maps he can plan a score of week-end trips in his own, or scores of other localities. These sixteen pages of colored maps, showing all sections of the country, will prove invaluable as a work of reference for the entire touring season.

* * *

THESE maps will prove invaluable for military use, showing as they do at a glance the road situation of the entire country, brought into less space than it has ever been done before. Roads are of more concern to all of us today than they ever were before. Roads will mean more to us for the next year or two, or three, than they have in the past. Each year finds our highways playing a greater role in the development of the country, and with war this situation would be increased severalfold.

* * *

HOW Italy has built roads on the Italian-Austrian frontier since the opening of the war is a special article from our European war correspondent, W. F. Bradley, who spent six months driving an ambulance on the Italian frontier, operating for much of that time out of the captured city of Gorizia. Mr. Bradley had for many months the best opportunity of observing just how roads were built. He took many photographs. These have been passed by the Italian censor and will be reproduced in Motor Age next week. He tells this road story in that same attractive style in which he tells of ambulance work on this front in Motor Age of last week and this week.

* * *

CAMPING and touring facilities do much to add to the pleasure of a trip. Next week Motor Age will describe and illustrate literally a host of devices and apparatus specially designed for the motorist with the object of making touring much easier, and with the object of making his or her trips more pleasant. Outdoor life in the motor car has increased the earning capacity of our business men many hundreds of millions a years, but you can add many hours to this outdoor motoring by camping equipment, cooking utensils and other apparatus that makes it possible to enjoy still more the great out-of-doors.

Lozier Motor Co. Factory Service

Later Organization Supplies Parts for Old Cars in Addition to Production of Four and Six

DETROIT, Mich., March 23—The present Lozier Motor Co. is comprised of an organization of men, some of whom have been well regarded in the financial world and who had courage enough to purchase the assets of the old defunct Lozier Motor Co. with the avowed intention of starting anew and bringing the name again to the front by conservative procedure, a quality product and fair methods of business dealing. While the financiers, it is true, were not thoroughly versed in the technical knowledge of the industry but had a working knowledge of the same, yet they immediately surrounded themselves with an organization, both in the factory and in the office, that was thoroughly versed in the industry and who were so well regarded in the positions they occupied with other large companies, such as General Motors Co., Willys-Overland Co., R. C. H. Corp., Pierce-Arrow Co. and Rolls Royce, that they were competent to take up the task of rehabilitating the old proposition and to rebuild it greater and better than ever before.

The old service department was taken over entirely by the new company. It consisted of parts of every possible description from a bolt up to a complete body for all the models that the Lozier Motor Co. manufactured from 1906 and including 1914. The stock, in some instances, was generally complete, and where there were some shortcomings, a large appropriation

was immediately made by the directors for the purchasing of immense supplies to round out the service to meet even an unusual demand on it. In this way, the new company immediately began to take care of those owners who may have been neglected during the period of the insolvency of the old company.

The new concern even went so far in some cases, from a sentimental standpoint, to make good by way of special prices and discount some of the shortcomings of the old company. It inaugurated a special "Owners' Information Department," which was confined entirely to the giving to owners all of the information possible for the proper operation and maintenance of the particular cars which they own. It made it a point to make a shipment of all orders the same day that they were received. In this way the new concern took care of all Lozier owners without regard to whether their car was purchased from the old or new company.

The product, since the taking over of the company by the present corporation, was confined in the first year to the manufacture of the Lozier type 84 four-cylinder car extensively perfected and the type 82 six-cylinder car with added body refinements and reinforced axles. The demand at first far exceeded the company's ability to supply, but when materials could be obtained more readily the increase in production became more decided.

The company, under present conditions, is considering the perfecting of its present product even to a greater extent and the addition, if the times should demand, of something additional to the line which will be in keeping with the high quality of the product manufactured in the past.

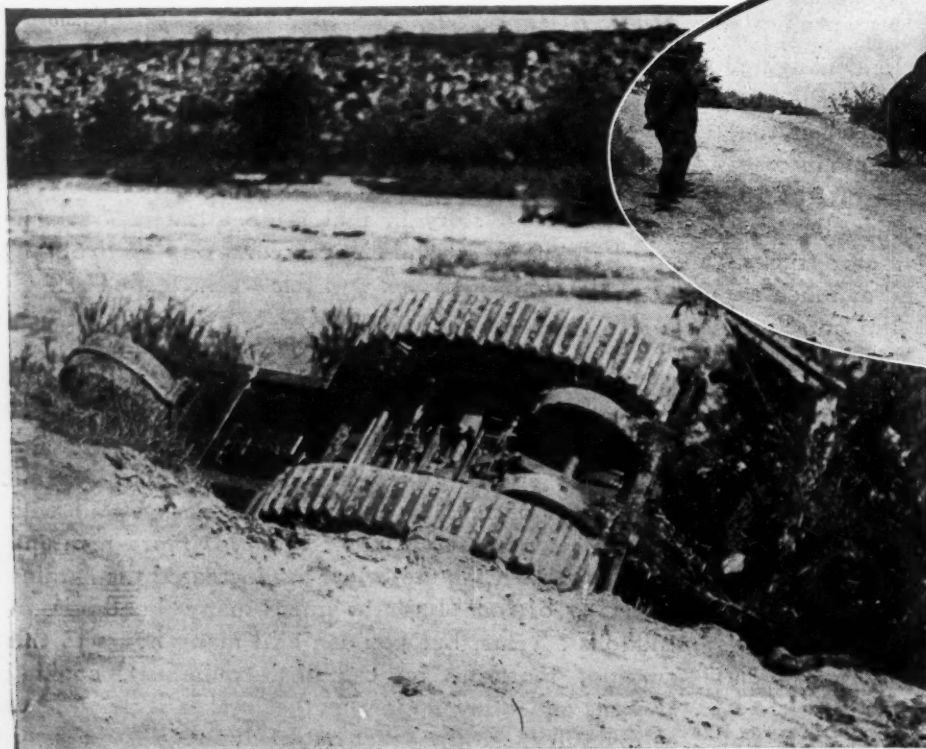
Although the service department of the company is adequate for the supplying to Lozier owners all the information for the proper upkeep of their cars and all parts necessary, no matter of what model, for replacement or repairs, the success of the company has spurred those at the head to appropriate a large sum of money for the additional purchase of quantities of parts, aside from those required for production, to be used exclusively for the filling of service orders in a prompt and highly satisfactory manner.

LISTON LEAVES THERMOID

Chicago, March 27—Joseph H. Liston, for several years western manager for the Thermoid Rubber Co., with headquarters in Chicago, has resigned to accept a position in the sales organization of the Standard Parts Co., Cleveland. He is succeeded by Dale O. Pohlman, formerly sales manager of Thermoid at Trenton, N. J. Harold F. Blanchard, formerly district manager at Philadelphia, succeeds Mr. Pohlman as sales manager.

WATSON HEADS LEE TIRE

Conshohocken, Pa., March 22—At the organization meeting of the directors of the Lee Rubber & Tire Corp. held to-day, John J. Watson, Jr., who has been vice-president and treasurer of the company, was elected president and A. A. Gartwaite, former president, was elected vice-presi-



A model tank constructed to be demonstrated to officers of the U. S. army turned a double somersault while climbing a bank after crossing the Los Angeles river, when the soft earth gave way under the 13-ton machine. The demonstration, however, was successful, as it showed how easily a machine used in time of war can cross a river and climb its banks. The tank is modeled after those in actual service in Europe

dent and treasurer. Henry Hopkins, Jr., was re-elected secretary.

A number of questions with regard to the manufacturing end of the business and the future dividend policy were brought up at the meeting. It was stated that it was probable that no action on the part of the board of directors would be taken on the question of resuming payments on the stock until such time as the \$1,000,000 debt has been wiped out and in addition a good surplus reserve built up.

COLT HEADS U. S. RUBBER

New York, March 22—S. P. Colt was today elected president of the U. S. Rubber Co. at the directors' meeting. The other officers elected are: J. B. Ford and Lester Leland, vice-presidents; R. B. Price, vice-president in charge of development department; H. E. Sawyer, vice-president in charge of foot-wear department; E. S. Williams, vice-president in charge of mechanical forces; Samuel Norris, secretary; J. D. Carberry, assistant secretary; W. G. Parsons, treasurer; and A. J. Hathorne, assistant treasurer.

NEW VACUUM FEED SUIT

Chicago, March 27—Suit has been filed in the United States district court, Chicago, by the Stewart-Warner Speedometer Corp. against the Auto Parts Co., Chicago, distributor of the Thermos vacuum system, manufactured by G. F. Weinberg of Detroit, Mich. This suit is based on the Webb Jay patents under which the Stewart vacuum system is manufactured. The suit is in harmony with others which are being prosecuted against alleged infringements of the patents under which the Stewart vacuum system is manufactured. While this most recent one has been filed against the Auto Parts Co., which is merely a distributor, the object is to obtain action on the Thermos vacuum system. It is understood that the manufacturer of the Thermos system will defend the suit.

HOLDS FOURTEENTH SHOW

Pittsburgh, Pa., March 24—Pittsburgh's fourteenth annual show was brought to a close in Motor Square Garden to-night after a run of one week. Attendance was considerably better than last year, and dealers report prospects have bought cars freely. The show is staged by the Pittsburgh Automobile Dealers' Association. This year part of the show, consisting entirely of cars in the higher-price field, such as the White, Packard, Pierce-Arrow, Simplex, etc., was held in the Hotel Shenley and this part corresponded to the salon held in New York and Chicago. This section was not as well attended as the main show. The hotel is about 2½ miles from Motor Square Garden. The show is essentially a retail show, though many dealers from outlying sections attended. Each year the management sends out about 2000 dealer tickets.

Denver Show the First in Two Years

Trade Territory Offers Excellent Buying Prospects for Coming Year in View of Its Scattered Population

DENVER, COLO., March 25—Denver's fourteenth motor show, the first one in two years, has been a real success from a dealer's standpoint, even though a rather heavy snowstorm lessened the number of visitors. For snow means more moisture for the dry-farming districts and there is already enough in the mountains to insure an abundance for the irrigated lands this year, so that the dealers are sure the farmers will figure very strongly on buying cars.

The three Rocky Mountain states comprising the territory supplied by Denver distributors, Colorado, Wyoming and New Mexico, are counted on to buy 12,800 motor cars this year, a larger number than it looks when one considers the population of this approximately 200,000 square miles of scenic highways and parks, a little more than half that of Chicago.

The increase would mean a gain of only 21 per cent over last year's total registration of 60,224 for the three states, while

that figure showed an increase of 22,677 cars, or 60 per cent over the 1915 registration. As it is now, there is one car to every twenty-six of the district's 1,565,000 inhabitants, and the ratio is growing more rapidly in the rural sections than in the cities.

Thirty-nine makes of passenger cars, five makes of commercial vehicles and seven accessory exhibits composed the show. There were only seventy-two spaces, and these were all filled. In fact, there would have been more cars on exhibition if the space had been available. The exhibition is a private enterprise conducted by H. F. Blackwell and E. R. Sowle. The downtown stores have been holding a fashion show week also, which helped the motor show attendance.

There is no big boom of industry and wages here such as has developed in eastern manufacturing centers handling immense orders for war materials, but there is a steady growth in the main industries of the territory, and the motor trade is getting its share of benefit from the added wealth produced. While the purchase of cars is not nearly so extensive among wage-earners here as in some parts of the nation, still there are occasional sales to mechanics, schoolteachers, clerical workers and others not far up in the financial scale, and car ownership is becoming established among a wider range of classes than it was three or four years ago. In this particular territory, a large part of the gain in sales during the last year or two has been among farmers and stockmen, and this situation promises to continue.

NEXT WEEK—TOURING ISSUE

Next week's touring issue of Motor Age will contain sixteen full pages in color of detail maps of many sections of the country. These sixteen pages of section maps have been prepared in the last six weeks and present road information that will enable you to lay out tours over the entire country, as well as short week-end tours around your home or out of scores of other cities, where you may be several times during the coming summer. These maps will enable you to lay out short trips for such holidays as Decoration Day, July 4 and Labor Day.



This is a new type of tank made by the French. A barbed wire cutter is in front

America's Stock of Armored Cars



To show its brawn, a tractor hauls a 6-in. gun through hub-deep mud

IF GERMANY took the howitzer trick with her Krupp 12- and 16-in. trumps, the British appear to have cleaned up the armored car trick with their tractor ace.

According to the more or less frenzied reports of "war despondents" on the Allied front, a steel, turtle-backed monster sauntered out of the gray dawn of the September day, ambled calmly up to a stone wall, broke down the wall, clambered over it, hummed and clanked down one side of a mine crater and up the other, and finally stood athwart a badly damaged German trench while the men within the steel body happily shot up the horrified Germans in said trench.

Like Thrillers of Old

The story reads like Frank Reade's "Steam House," the account of which, costing one jitney, we used to sneak into places of privacy in our younger days and read with 'bated breath and an ear out for ancestors of maternal variety. You'll recollect—even though you won't admit it—that Frank Reade used to get up wonderful steam houses in which he and his friends would ride and defy savage tribes and union car strikers and other dangers of the wilder portions of the globe. The houses had steel sides and guns and traction-power furnished by an engine within.

After duly bragging about how the great armored monsters trundled through the ruins of a beet-sugar factory and shot up the German machine gun crews in the debris and how they captured fifty Germans at one fell swoop, the reports went on to tell how the machines were triumphs of British mechanical ingenuity, how they had been assembled with much secrecy in the Midlands and how they had been such a surprise to the Kaiser that he contemplated offering the surrender of Berlin the next day—or words to that effect.

Without doubt the efficiency of the ponderous war machines is all the British claim it to be, from what we know of the mechanical basis thereof, but they were not al-

Tractor Possibilities

By Edward C. Crossman

together triumphs of British mechanical ability alone for the Yankee in the humble town of Peoria, Ill., furnished the foundation.

For more than two years before the war the Germans had been buying Holt tractors from Peoria. The British bought, after the war broke out, 200 or 300 of these tractors, and with them they bought great caterpillar wagons, trailers with the peculiar self-laying track of this type of vehicle, designed to carry thousands of pounds of the huge shells for the new British howitzers. Both British and Germans thought of these machines only as being able to haul huge loads over roads. Apparently the idea of armoring one of these slow-crawling machines came only after the start had been made in the Somme offensive.

At present the American Government owns a half dozen or more just finished armored trucks—armored cars as they are commonly known. They are strictly road machines, not trench hogs and crater climbers. Where the road ends, they stop, if the drivers are wise.

Major L. B. Moody of the ordnance department of our army, in charge of this work at Rock Island, Ill., produced as his first effort this summer a double-turret armored car carrying two machine guns capable of the speed of 600 shots a minute a gun and a crew of five men and weighing 6½ tons. He took a Jeffery quad chassis, weighing 3 tons, and driving as the name implies, on all four wheels instead of merely on the rear ones, and on this he built up a strong skeleton of steel like the structural iron work of an office building. On the frame were bolted and riveted plates of quarter-inch specially treated steel, every one tested by being shot into with the army rifle.

There are on this model two turrets, revolving on bronze beds and operated by hand-wheel and pinion inside the car. Each turret contains a machine gun and its operator. The car is thus a regular monitor, the cheese box on a raft, minus the raft.

Ten to 20,000 rounds of ammunition for the guns are carried in the car—a round being one single solitary cartridge. Ports are cut in the turrets, and the gun mounts permit an angle of fire from below the horizontal straight up to the azure voids above. The outside of the lovely steel is painted army drab, the inside white for the benefit of the not too-good light that seeps in through protected ports here and there. The armor extends down to protect the radiator and all parts vulnerable to bullets, except the wheels, which in future cars will no doubt be taken care of in some way.

These ponderous 6-ton machines have a maximum speed of about 25 m.p.h., but they make up for their having to keep within the speed limit by having a special low-gear arrangement which permits the engine to turn sixty-five times to one turn of a driving wheel on the road, and thus gives huge power for any grade and for very poor road conditions. All four wheels being driven, of course, adds to the traction of the car. Heavy compared to the commercial truck, these American armored cars still are much lighter than the British monsters which showed such a happy indifference to roads and ground condition. They weigh 9 tons without the armor and, judging by the American car increase, probably twice this with armor, crews, guns and ammunition.

Both Types Have Place

Both types of armored car have their place in the equipment of a modern army. The armored road car probably is the most useful for American warfare, in which trench fighting and deadlock is not likely. Where the armored caterpillar with its maximum speed of 3 m.p.h. is a poor machine for an emergency call to a point 10 miles down the road, the armored truck, the road car, would make a sorry showing climbing out of a well blown-up mine crater. In the late days of 1914 and the second German attempt at the Ypres line in 1915, the armored cars of the British, invulnerable to rifle and machine gun fire, did splendid work reinforcing bulging points in the thin British line.

Most of the amateur attempts to armor cars have been sorry ones. The army cars are different again. The amateur seemed to feel that any sheet of metal thicker than the bottom of a tin pan would do for armoring the make-shift armored cars they produced. Such metal does splendidly until some cruel person hits it with a bullet. The modern military bullet is an earnest, one-purpose sort of a missile. Leaving its

rifle at the speed of from 2700 to 3000 ft. a second, or two and a half times the velocity of the old black powder arms, it gets over a half-mile of space in something like $1\frac{1}{2}$ sec., and it fiercely resents being interfered with on its way. The German Mauser, the Japanese 0.25 cal. army rifle, the Greek rifle of the same size and other modern arms will shoot cheerfully through a half-inch of mild steel—boiler plate.

As even half-inch boiler plate weighs 20 lbs. to the square foot, it is evident that one has to be a little careful what he selects as the outer coating for a fighting car. The armor on the Yankee armored cars is made of quarter-inch specially treated steel, toughened and hardened, where double the thickness of ordinary steel won't work.

Advantage of Powdered Glass

An American mechanic, working in Germany before the war, reported on his return that the Germans had armored their cars with light steel plates, with a lining of powdered glass between them. This is a logical arrangement, because powdered glass and sand are much the same, and 4 in. of dry sand stops and shatters to fragments the bullet from the army rifle of the United States, encased, though it is in a tough jacket of German silver. It would take very little sand or glass to wreck a bullet so thoroughly that it could not get through the light steel plate on the other side of the compartment forming the armor.

With enough of these armored cars turned out on the Jeffery and White chassis to take care of present army needs and afford a fair trial of their merits and lack thereof, the next step of the ordnance department doubtless will be to armor a cat-erpillar.

The lay mind classes the caterpillar tractor as a sort of a freak, gas-engined-propelled vehicle and lets it go at that. The enormous power and the traction and the go-anywhere ability of these queer monsters is rarely appreciated.

Some months ago one of these caterpillars, a Holt 45 hp. machine, was sent down to the field artillery testing grounds at Fort Sill, Okla., and was turned over to the tender mercies of the gunners. After



A section of siege artillery on the march with the tractor instead of horses

driving it around the roads a while so it got used to cannon and other things not familiar sights in Peoria, the artillerymen hitched it up to a section of siege artillery—as the Germans had hitched its brothers in 1914—patted its flank and told it to “git up.” It got. The section of artillery consisted of a 4.7-in. siege gun and its limber, weighing 8800 lbs., and a caisson, loaded, with its limber, weighing 8200 lbs., a total weight of the little outfit the tractor was to haul of $8\frac{1}{2}$ tons.

Usually they move such pea-shooters with sixteen horses to the gun and sixteen more to the caisson, and the section stretches out over about a city block of most valuable road space, valuable because the longer your army, the longer the rear end is in coming up, and the fatter chance an enemy has of chopping off 4 or 5 miles of it.

The tractor went clanking and puffing off with the siege gun behind it, bound for the most choice spots of bad-land the artillerymen had been able to find around Fort Sill. It went down a sharp turn into a creek bottom and up a grade said by Captain Bryden to be 30 per cent. Up this grade it dragged the long gun and limber and caisson and limber, $8\frac{1}{2}$ tons worth. They struck a creek yecept Beef creek, and it seems that the bank of said creek is as steep as the price of any beef—40 per cent on the little rise out of the water.

The tractor stopped three times on the grade to speed up the engine, but just the

same it yanked the ponderous siege gun and its appurtenance up this 40 per cent grade out of the creek bottom. Then they came to a railroad bridge in their wanderings, a plain, undraped, unadorned single track railroad bridge without planks over the ties. The officer who ordered a heavy siege gun and its sixteen horses to cross such a bridge would leave just three jumps ahead of his indignant cannoneers and drivers. The tractor looked on such a bridge as unusually good going for a down-trodden tractor and proceeded to haul the bumping, clattering gun and caisson across. At one spot a tie was missing, and each wheel of each carriage dropped into it with a thud, but it didn't cut any figure to the iron truckhorse up ahead. It requested them to come on out of it—and they came.

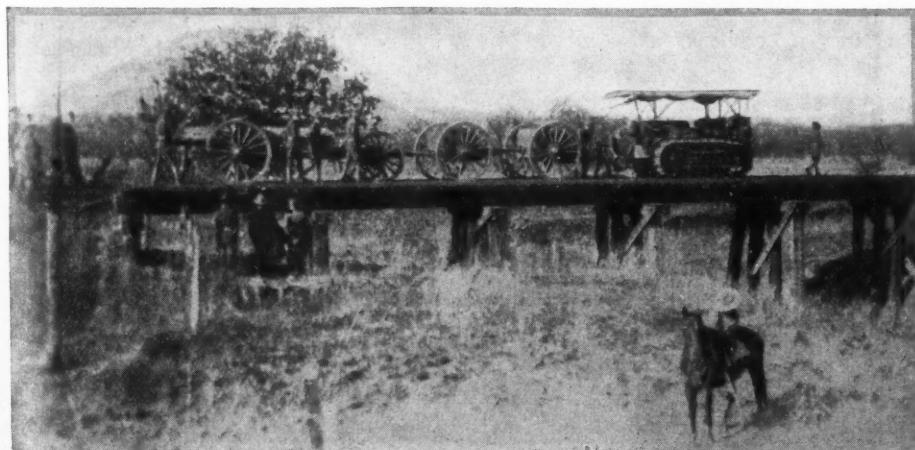
Finale in Sticky Mud

As a final test the army men sent the tractor and the gun down into a gully filled with sticky, deep mud, with instructions to go down into the mud, cross, turn around and come back again. It did, and got nearly out when the wheel of the gun unearthed a huge rock and the proceedings stopped for a time. The gun and carriages were nearly axle deep before the rock was unearthed. Also a 13,000-lb. tractor was in the middle of the black, deep, sticky mud, mud so deep that any wheeled vehicle would have been resting peacefully prone, waiting for Farmer Jones and his team of mules.

The tractor hauled the 8200-lb. caisson out of the mud; then hitched to the gun with a tow-rope long enough to get footing on solid ground instead of the mud which flowed under the drive of its belt, the tractor yanked out gun, rock and all.

This was a little tractor, just a cute little 45 hp. 13,000-lb. one. The British, however, bought 75- and even 125-hp. tractors, and in their armored monsters of the Somme front they used either of the two larger machines.

In view of what the little one will pull, it is no wonder that the bigger ones can trundle themselves and their armor and guns and crews around the craters and trenches of the front. Such machines will negotiate almost any grade, where the machine doesn't fall down hill, without particular reference as to which side is up.



Crossing an open railroad trestle, impassable by a horse-drawn gun



Bringing in wounded on stretchers during a battle on the Italian front

Moving Italian Wounded Under Fire

Efficiency of Ambulance Service Told by Driver

By W. F. Bradley

In Two Parts—Part II

Buick ambulances at a front line dressing station. Shell fire has blown away a corner of the building

WAR conditions are so varied that it is a difficult matter to devise an ideal type of motor ambulance suitable for all parts of the front and what may be called the near front. For one particular run, entailing a night dash into a village and a speedy return, the most suitable car was found to be a fast 40-hp. Mercedes converted touring car. On another occasion, where a very unstable bridge had to be crossed under darkness, the Ford was supreme, yet both the Ford and the Mercedes were unsuitable types for general work. Over good roads at the rear, where the work is regular and comprises the clearing of permanent hospitals and loading from trains, a low-powered car can give satisfactory service.

On the lower Isonzo and the Carso, where there has been the greatest military activity and conditions are most strenuous, it was found that the 4 by 5.5-in. Fiats and the 3.7 by 5 Buicks were the smallest engines which could be relied on to do the work. The G.M.C.'s, with Continental en-

gine only slightly smaller than the Buicks, were often unable to make trips which these latter could perform with comparative ease. Frequently the G.M.C. drivers would refuse to make runs the Buick drivers were ready to undertake, or they would make a considerable detour to avoid hilly and rough roads, yet the difference in the size of the two engines is only 32.5 cu. in., the chassis and bodies being identical.

Efficiency of Engine Types

All things considered, a 275-cu. in. engine can be accepted as sufficient for ambulance service on any front. During the first year in Italy, when mountain roads were in a very much worse condition than at present, there were a few periods during which the ambulances did their work with great difficulty or failed to do it, but generally the power available was sufficient, and a larger engine would have been unsatisfactory and uneconomical. An engine of 275 cu. in. maximum, with a maximum load of ten patients, is a very suitable combination for work at the front. Naturally in the base towns, where road surfaces are always good, other combina-

tions of smaller engines or bigger loads may be suitable.

It would appear that in designing the Italian army type ambulance the authorities had in view the importance of removing stretcher cases as quickly as possible, for the ambulances are built to carry six stretchers in two vertical rows of three each, but are not particularly suited for sitters. To get three stretchers superimposed entails a body of 5 ft. 6 in. internal height, and makes the vehicle top-heavy. The stretchers are carried on spring-mounted hooks attached to the left and right-hand walls of the car and stout canvas slings hanging from the roof. This leaves the body entirely free of internal fittings, and when sitting cases have to be carried rough wooden benches are made use of. Even during an offensive the proportion of sitters to stretchers is at least 10 to 1; during the winter months, when much sickness and little fighting may be expected, it is considerably higher. A better arrangement would appear to be to decrease the height of the body, so as to carry only four stretchers—two on a side, and have hinged racks to receive the



Two implements of modern warfare—a life-killer and a life-saver

stretchers. This gives sitting room for five men a side, and allows conversion to stretcher work in a few seconds.

The regulation Italian ambulances are wood and metal construction with rear doors and four louvre windows on each side. The bodies are well made and generally satisfactory. The rear doors, however, are necessarily heavy, locks are apt to get out of order, allowing the doors to fly open at unexpected moments, with much consequent damage to themselves and to people or vehicles on the road at the time. Ambulances have pneumatic tires of 34 by 4½ in., mounted on detachable steel disk wheels, single in front and twin at the rear. Two spare wheels are carried.

Bodies of Canvas and Wood

The Buick and G. M. C. chassis employed by the British Red Cross in Italy are entirely different in their body arrangements. They are designed to carry four stretchers and eight sitters, but the load is invariably increased to ten sitters—on the Buicks at any rate. The body is canvas and wood with a canvas flap at the rear capable of being rolled up to give a free entrance. The main advantages are

lightness and low initial cost. For rough work at the front, however, a canvas cover is not ideal. When night driving has to be indulged in on narrow roads carrying dense traffic, it is impossible to run for any length of time without scraping the overhanging branches of trees and shrubs, or the overhanging loads of other vehicles. While a scrape would only mean a scratch on a sheet metal body, it produces a tear when the covering is canvas. Further, it is a difficult matter to keep a canvas body clean, either inside or out. Probably with a view to simplicity, there are no buckles for fastening the rear flap; instead, the canvas is eyeletted, and these holes are supposed to fit over staples on the sides of the body. In practice there is so much shrinkage in the canvas that after a few weeks' use each hole is short of its staple by at least an inch. Consequently the back never is fastened down, but allowed to hang loose.

Converted touring cars, of which there must be some hundreds in use, almost all have the disadvantages of being too high geared and too light in general construction. They are limited to four stretchers

or six sitters, but even with this small load there must be considerable rear overhang which is not advantageous for either the vehicle or its passengers. Further, to keep down weight, the bodies are made as small and as flimsy as possible, usually without windows and without direct ventilation.

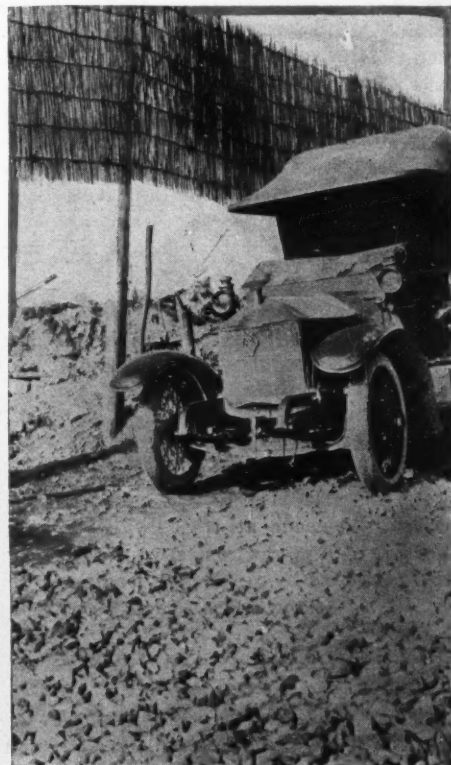
On the Italian front, at any rate, it is surprising how little use existed for the small capacity, light weight ambulance of the Ford type. On the steep mountain roads with very rough and muddy surface, the Fords would stop by reason of overheating where a Buick or Fiat would climb on low gear with a load of eight. Where no road existed a three- or four-horse team might go through where a car could not pass, but even in these difficult cases quicker service could be counted on if motor cars handled by skilled drivers were taken as near to the front as possible and the stretchers carried out to them by crews of four men. The time lost in carrying the men out individually would be regained as soon as the car got on the move.

Mechanical Aids to Service

Probably it is not sufficiently realized that there is a very close connection between chassis suspension and general balance and life-saving and the minimizing of human suffering. The easiest riding ambulance of which the writer has had any experience was a Fiat fitted with Houdaille shock absorbers. It was not ideal in every respect, but its suspension was so good that it was always selected for seriously wounded officers and men who could not have been transported without



Loading an ambulance with water to be taken to the front line dressing station



Ambulance traveling over the rough road across a former battlefield



Italian ambulance at a field dressing station

grave danger in any other car. A high official whose leg had been shot away was carried to the rear in this car and arrived only a few minutes after a touring car which had gone ahead to advise the hospital staff of the patient's coming, for good suspension can be translated into terms of miles per hour, and a few minutes saved on the road may make the difference between life and death. It is well known at the front that some ambulances can travel over rough roads faster than others, not on account of their higher power, but entirely because of their better riding qualities. The worst motor ambulance is decidedly better suspended than the best horse vehicle but there are greater differences in the springing of different makes of motor ambulances than is generally realized.

One of the most important motor ambulance services is the traveling field hospital. In order that human life may

be saved, the best surgeons a country possesses must be kept immediately in the rear of the armies; it is not necessary that they live in the bombarded zone, but they should be within 30 or 40 mins. motor car journey of the firing line, and capable of maintaining this distance as the armies advance or retreat. This condition is obtained by means of motor field ambulances. The equipment will comprise half a dozen trucks capable of carrying all the tents and medical equipment, a few ambulances and probably a touring car. Theoretically the motor field ambulance is entirely self-contained. In practice, however, the camp is always pitched by the side of some building. A public school is ideal and a wrecked cottage is not to be scoffed at.

Where Complicated Cases Go

The motor field hospitals never receive sick or slightly wounded cases, but are given the more complicated cases beyond the skill of the divisional dressing station

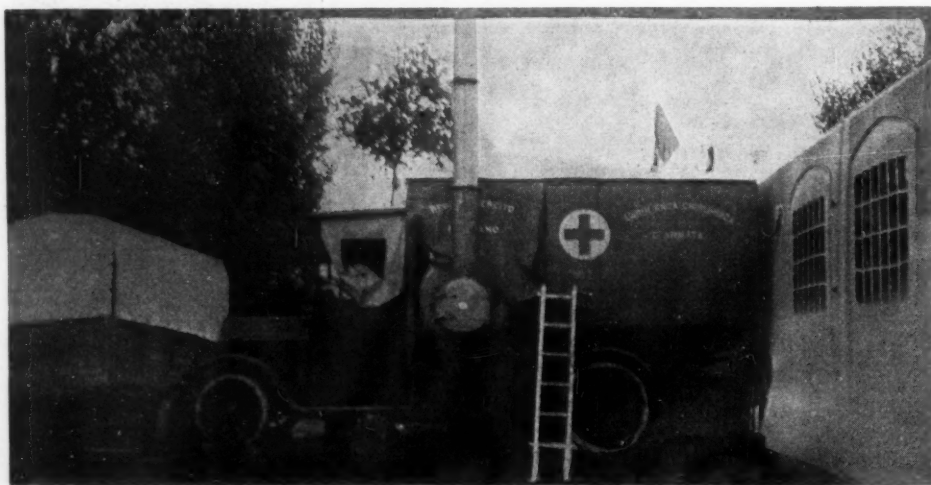
surgeons. These men go direct to the field hospital without passing through the clearing station. They are usually in such a condition that a delay of a few minutes may decide between life and death, and only the intervention of a highly-specialized surgeon can save them. According to military conditions the field hospital may remain in one place six months, or it may have to move forward at intervals of six days or less. The equipment and staff are such that within 24 hrs. the whole of the tents can be pulled down and the entire hospital be in operation at some point several miles away. Usually there are forewarnings that a movement is about to become necessary, in which case the time of removal may be cut in half.

Remarkably efficient work is done by these motor field hospitals. Immediately the ambulance draws up stretcher-bearers carry the wounded men into an operating tent heated with hot-water radiators obtaining their supply of water from a boiler mounted on a truck. The men are stripped and laid on the operating tables, and while this preparatory work is going on a secretary is recording in his register all particulars regarding the man, obtaining these either from the docket attached to his uniform, or if he has come direct from the place where he fell, from the identification locket which every soldier carries. Usually within 5 mins. of a man being unloaded from the ambulance the surgeon is at work on his wounds.

Usually these hospitals are provided with X-rays installation, and all of them have a sterilizing plant, running hot and cold



Among the living and the dead—a motor ambulance passing over an old battlefield. This road, being under enemy observation, is screened



A field ambulance at the front. A boiler is mounted on this truck to provide hot water for the operating room



Fiat ambulances outside one of the big stationary hospitals behind the Italian lines

water, electric light and an adequate supply of beds to receive men recovering from wounds. Briefly, everything to be found in a first-class surgical hospital at the rear is united in these traveling hospitals just behind the lines. A large quantity of motor equipment must, of necessity, remain idle. When an army has settled down for a winter campaign, for instance, it is known that there will be no necessity to move for two or three months. Thus the trucks for transporting the material, the boiler wagon and the X-ray car are jacked up on heavy blocks of wood, and only the ambulances are kept on the road. Being so near the front, it is important that these hospitals should be prepared for all eventualities, thus as soon as ever they are in a condition to be removed wounded men are carried in the motor hospital's own cars to the permanent hospitals farther in the rear.

Hospital Train Service

No mention has been made of hospital train service at the front. The hilly and mountainous nature of the Italian front make it impossible for trains to be run as near to the zone of operations as is the case in France. Also the Italians are at every point in the enemy's territory, and as they retreated the Austrians naturally destroyed their railroads which, incidentally, were not so good nor so well developed as those of some other parts of Europe. Compared with the motor ambulance work in the actual zone of operations, the train service is simple and lacking in interest. The part played by cars is the carrying of men who have already received medical attention and probably been in hospital for a week or more, from the permanent hospital to the train. Also, on the arrival of the train in some town perhaps several hundred miles from the front, motor ambulances have to be in readiness to distribute the wounded to the hospitals.

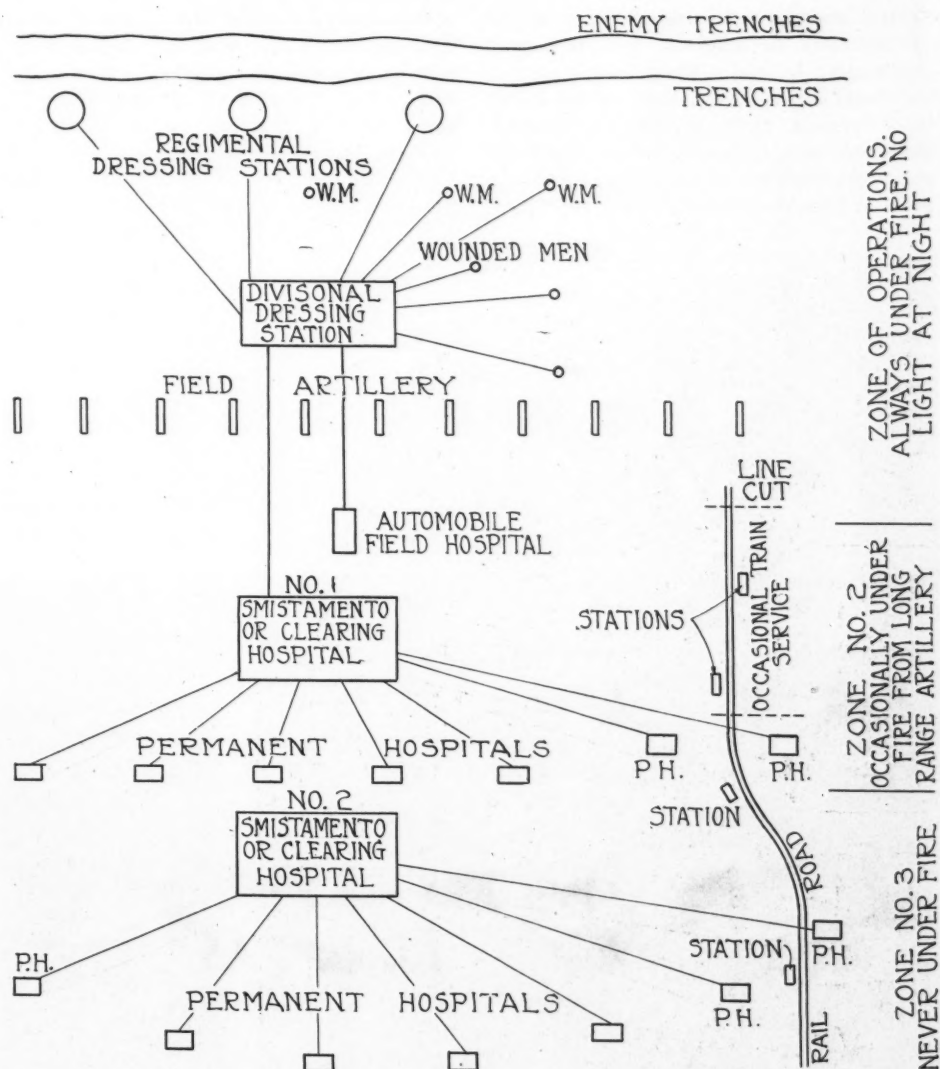


Diagram showing how Italy's wounded are passed back from the trenches to dressing stations and hospitals in the rear

Motors and Women in Old England

By Mary Hartley-Smith



To make things equal, he should be the milkmaid shy, for she has donned sterner garb and drives a one-horned creature now

THE shortage of labor in agricultural districts in England and the commandeering by the military authorities of the best horses have made occupiers of land, farmers, fruit growers and market gardeners turn to the petrol-propelled vehicles for a means of conveyance of their produce. Land workers in the "Old Coun-

try" are somewhat conservative in their methods, and it was some time before they were convinced of the saving of time and money to be effected by the substitution of motor lorries for the old horse-drawn drays. Once convinced, however, there was no turning back, and the number of mechanically-propelled conveyances used by the market gardeners in fruit districts is increasing steadily. Circumstances have assisted them, for many private owners have been glad to dispose of high-powered, though somewhat out of date, touring cars, and these have made wonderfully efficient lorries. With one of these conveyances one man easily can do the work previously done by three or four horse-drawn drays, and though the initial cost may be somewhat higher, this is more than repaid by the reliability and celerity with which the new vehicle performs its task. The old farmer of the Midlands gives another argument in their favor. He has discovered that they only consume fuel when they are at work and do not, like horses, "eat nights and Sundays."

The help of the motor was one means of assisting the shortage of men's labor, but had not the women of England come to the assistance of the land and its owners the crops would not have been so successfully

sowed, reaped and garnered as they were in most districts in Great Britain.

In secluded country districts it has been awkward for outside help to be brought, and even more awkward to lodge it, so the women and girls have put their hand to the plough, from dawn to dusk working with a will, though often with heavy hearts, and farmers and gardeners are loud in their praises for these loyal subjects, who are taking the place of husbands, sons or brothers.

Women Camp in Colonies

In other districts there have been colonies of well-educated women camping, often in barns or tents, who though totally unaccustomed to manual labor have done admirably, many finding the open air occupation greatly beneficial to their health and physique. And none desires praise, for all realize they are "doing their bit" and doing it with a will. In the fertile valley of the Avon, which washes the banks of Worcestershire, Warwickshire, Oxfordshire and Gloucestershire, the women have put their motors, both touring cars and motor-bicycle combinations, at the disposal of land occupiers, and have themselves donned the regulation dress of a land worker, that is khaki breeches, long coat and leggings. Driving their vehicles, they have spent long days either conveying produce to the local markets or railway stations or running between one holding and another. One lady has been invaluable in taking a busy manager from his land which lies many miles distant, and for this she has used her motor-bicycle combination in all weathers. The light car has



Not for pleasure but for business is this Englishwoman bridging the gap 'twixt car and barn



If farm produce to the railway station must go, go it must in a car driven by a woman



Evesham women gardeners have put their touring experience to useful purpose. There would be little need of their gardening otherwise, as this is the only way to get the produce to markets and railways

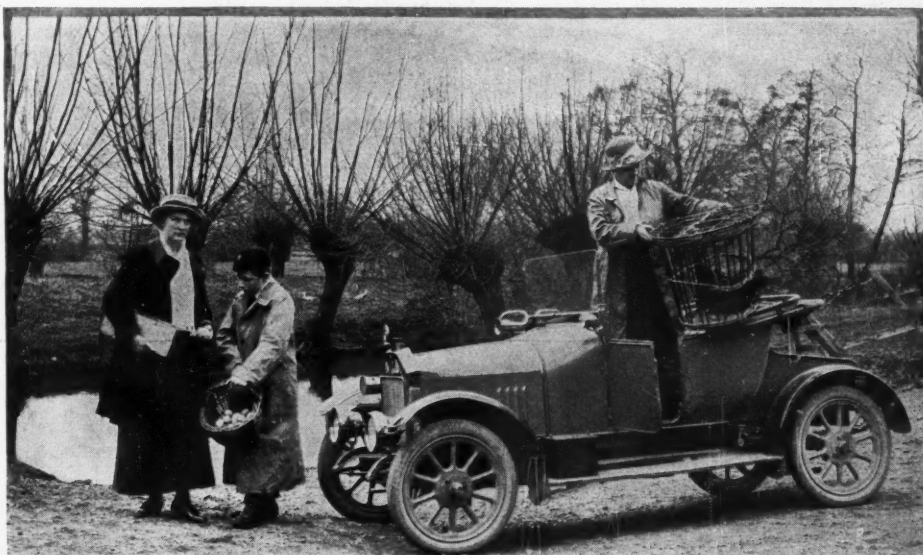
been very noticeable, for women are able to manage these vehicles themselves, and those mechanically inclined have learned roadside repairs.

One woman has made use of a little business-like 10-hp. Swift car for visiting the market gardens in the Midlands to collect fruit and vegetables for the V. A. D. Hospitals. She is known to many farmers and gardeners. Another woman spent most of the spring, summer and autumn last year collecting, in a similar manner, garden produce, which is carefully packed and sent to the navy. After the short days arrived and motoring became anything but enjoyable it was quite a sacrifice for women to leave their comfortable homes and bright firesides, but the plucky English maiden puts aside her own pleasure in war time and, attired in warm clothing, was still to be seen at the wheel of her car or taking the place of a man who had been called up for service.

There has been one great drawback in the use of motors in the agricultural districts of England. That is the scarcity and high price of petrol. Each owner has been allotted his share, but this is very meager and often most insufficient for the car owner to convey his produce, except short distances. Among those who have given assistance to land owners and workers are Mrs. Lees-Milne of Wickamford, near Evesham, Worcestershire. She has driven a Ford lorry, with trailer attached, from dawn till dusk and although she is not able to always lift the heavy hampers when she reaches her destination, there are ready hands to the fore. She was always accompanied by her huge boarhound, a great white animal who occupied the vacant seat by her side. Miss Gladys Fisher has found her Arrol Johnson car of great value in taking her father about from one farm to another. Miss Joan Sill, whose motor bicycle is so well known, is an energetic war worker on a farm, and many other women were to be seen daily

with willing hands and ready hearts "doing their bit" for though they knew they

could not "wield a sword they could work a ploughshare."



In a Warwickshire poultry yard, preparing to take eggs and birds to market by car



A swift light motor car helps to bring straw to thatch this wheat rick. Notice the woman's garment, which is a common costume in work of this nature



England calls this converted Ford car a lorry. Just now it is being packed with tomatoes grown in the Worcestershire glass houses

The woman works side by side with the rare man field laborer who is left to do England's farm work. The car usually is seen nearby as it will be needed to transport the straw after it is collected into a pile



The greenhouses of England more often than not are greenhouses that force vegetables rather than the customary flowers. Women and cars are their aids

Laws Make Better Roads Possible

Bills That Affect Motor Cars and Highways Are Considered by the Various Legislatures

THAT the cause of good roads is marching onward, and onward with steady progress, is evident from the activity in the various legislatures this year in that respect. Bills immediately affecting the growth of the highway systems of the country and the conduct of motor cars thereon have either been acted on already or are being considered in most of the state lawmaking bodies. Texas will have its first state highway department after July 1. Missouri has provided for a highway commission. And so has North Dakota. New Jersey has created a commission. Delaware was practically assured of one from the first introduction of a bill proposing a commission.

Illinois' governor and good roads conference approved a \$60,000,000 bond issue bill, and it was unanimously reported out of the house committee the 22d of this month. This bond issue bill provides that the issue shall be financed by the receipts from motor vehicle licenses and establishes a general system of road building, stipulating the county seats and chief cities that must be connected by the bond issue roads. Coincident with the approval by the committee of this bill the judiciary committee reported out the bill to increase motor car licenses, practically doubling them by 1920.

On these two pages are advices from the various legislatures of this country and from Ontario. Each contains some one or more examples of advance in the building and maintenance of roads throughout the continent, though some deal more directly with the licensing and regulation of motor vehicles and travel. Other examples of the same nature have appeared in *MOTOR AGE* just recently, and each has the same story to tell, more widespread recognition of the universal use of the motor vehicle and the importance of good roads.

IN TEXAS

Austin, Tex., March 23—The bill creating a state highway department in Texas goes into effect July 1. It carries with its provisions for taxation, according to which commercial vehicles are taxed by the carrying capacity per wheel, from \$20 for between 1000 and 2000 lb. per wheel to \$300 for between 8001 and 10,000 lb., loads greater than 10,000 lb. per wheel causing a charge at the rate of \$500 per each 1000-lb. increase or a fraction thereof, provided no load greater than 800 lb. per inch width of tire per wheel shall be permitted and no vehicle of a total gross

weight of more than 14 tons shall be licensed. Other motor vehicles are taxed at 35 cents a horsepower.

IN MINNESOTA

Minneapolis, Minn., March 23—With the probability of the passage by the Minnesota legislature of a bill making it a misdemeanor to steal or borrow a car without the owner's consent, the action of the Hennepin county judges is likely to stop widespread thievery. Judge H. D. Dickinson has just sentenced a man to from one to ten years in the state prison for taking a car. Grand larceny in the first degree was the charge.

A bill has been introduced into the legislature providing for a commissioner of highways to be appointed by the governor at a yearly salary of \$4,500 for six years. He will replace the state highway commission. The bill provides for an optional road tax, not more than 10 mills.

IN CONNECTICUT

Hartford, Conn., March 23—Just what the Connecticut legislature now in session will do with the motor car law is of particular interest to dealers, because they believe pro rata registration fees after April 1 tend to discourage winter buying. The one big question insofar as the dealers are concerned at present is the modification of the law which will permit a dealer to use his car to go home to dinner or take his family out or do any of those things not actually covered by the law which states a car under a dealer's license shall be used only for actual demonstrations, testing or adjustments. The committee on roads, rivers and bridges, to whom the law has been referred, gave a hearing last week.

Provided two bills pending before the state legislature pass, all railroad crossings in the state will be protected by danger signals at night. One bill calls for some sort of signal to warn motorists of the proximity of a crossing, while the other calls for a lighted sign bearing the word "stop." It is expected the measures will go through.

COLORADO'S LIEN LAW

Denver, Colo., March 23—A bill for a lien law to protect all branches of the motor car business in Colorado has been introduced in the state legislature. The measure provides for a lien on all kinds of motor vehicles to apply to charges for storage, maintenance, keep or repair and for supplies, accessories, parts, gasoline or elec-

tricity and labor. The proposed lien is to be binding for a period of thirty days from delivery date, without filing or giving any notice, but the claimant must file a specified form of lien with county clerk and recorder to make a lien claim effective longer. Where lien is filed and claim collected, proper notice of settlement also must be filed with the clerk and recorder. Exemption is provided for innocent purchasers or mortgagees, where purchases or mortgage is made in good faith and without notice of such lien, but a penalty of \$25 to \$100 fine or imprisonment for thirty to sixty days is provided against an owner for selling or mortgaging a lien-bound car within the first thirty-day lien period without duly notifying the purchaser or mortgagee of the lien claim.

IN KANSAS AND MISSOURI

Kansas City, Mo., March 23—Missouri and Kansas have both passed new road laws during the recent sessions of their legislatures, and work under them is already starting.

Missouri has made longer steps forward toward good roads than ever in her history. One of them provides for a highway commission of four men, who will select trained road engineers to take charge of the building of 3500 miles of highways in the next five years. Money for these roads is to be obtained from the counties and federal funds, and it is expected that \$12,000,000 will be available for the purpose in the period. The commissioners are: C. O. Raine, Canton; George E. McInich, St. Joseph; E. L. Sanford, Springfield; A. E. McKibbin, St. Louis. The new law abolishes the office of highway commissioner, held by Frank W. Buffum.

The Kansas legislature also created a highway commission which, with the governor, will select highway engineers to plan and supervise the construction of roads; as well as a bridge bill under which the highway commission may exercise supervision over the kind of bridges built by counties and a new license law, so that \$4.50 of the \$5 fee goes to the counties and townships where the motor cars are owned.

IN ONTARIO

Toronto, Ont., March 23—Increase in the speed limit, regulation of headlights to eliminate glares and the licensing, without examination, of all drivers are among the more important amendments to the motor vehicle act which the Ontario Motor League will endeavor to obtain at the pres-

ent session of the Ontario legislature. A bill providing for the carrying of lights at night by all vehicles also will be introduced. That the present speed limit of 20 m.p.h. in the country and 15 m.p.h. in the city has remained long enough is the unanimous opinion of the board of directors.

An amendment to permit a speed limit of 20 m.p.h. in cities, towns and villages and 25 m.p.h. in the open country will be asked. The Province of Quebec recently increased the speed limit to 25 m.p.h. in the country and 20 m.p.h. in cities, towns and villages.

IN DELAWARE

Wilmington, Del., March 24—The Delaware legislature, having practically decided to create a state highway department with authority to take over the public roads, reconstruct and maintain them and build and keep up new ones, is wrestling with the problem of raising additional revenue for the State, as the highway bill will give the highway department the fees. The aggregate of these fees last year was about \$65,000; this year it will exceed \$100,000.

Warning lights are not necessary on vehicles using Delaware roads at night, except on motor cars, according to the judgment of the Delaware State Senate, which a few days ago killed a bill to require all vehicles using the roads at night to carry white lights.

ARIZONA AGITATES GOOD ROADS

Phoenix, Ariz., March 23—That Arizona is going in for good roads, and going in strong, is shown by the attention paid to the subject of highway building and maintenance, motor vehicle traffic, etc., by the state legislature now in session. One of the most important measures pending in the legislature would provide an annual road fund of about \$500,000 for good roads. Twenty-five per cent would be expended by the state and 75 per cent by the counties. The bill would raise this amount annually by a special good roads tax of 10 cents on each \$100 assessed valuation.

In addition to the state road tax bill there are many road and bridge bills calling for \$200,000 for bridges on the state highways. All the bridges proposed are on the main traveled tourist routes, and it is probable that practically all will be built during the coming summer. There is a wide tire bill prohibiting any tires less than 2 in. in width on vehicles other than rubber-tired vehicles.

GOETHALS TO NEW JERSEY?

Trenton, N. J., March 24—New Jersey is trying to get a bridge over the Delaware at Philadelphia and a tunnel or bridge across the Hudson into New York for motor traffic, as well as the road improvement work, Governor Edge is making an effort to obtain the services of Gen. George W. Goethals of Panama Canal fame as consulting

engineer on this work. It is said that General Goethals is willing to accept, and a bill has been introduced into the Legislature to make provision to employ him.

The new highway bills creating a commission to build and improve roads and authorizing the expenditure of \$15,000,000 in five years on this work have been passed and the commission consists of Col. A. R. Kuser, Bernardsville; John W. Herbert, Helmetta; George W. F. Gaunt, Mullica Hill; Col. Edwin A. Steven, present state highway commissioner, Hoboken; Watson G. Clark, Tenafly; Walter J. Bubzy, Atlantic City; Ira A. Kipp, Jr., South Orange and George E. Blakeslee, Jersey City.

The \$15,000,000 for road improvement will be raised by a special road tax of 1 mill on all real and personal property in the state. This new road act supersedes the Egan act which was endorsed by the voters last fall and which would have spent but \$7,000,000, this to be obtained by a bond issue and paid for out of motor vehicle licenses, fees and fines. The new law leaves the \$1,500,000 annual income of the motor vehicle department to be spent, as formerly, on upkeep of state roads.

IN PENNSYLVANIA

York, Pa., March 23—More than the usual amount of legislation of interest to the motorist is making its appearance at the session of the Pennsylvania state legislature. Several proposed amendments to the license laws have been introduced in the house by Representative Mearkle of Allegheny county. They limit the size of motor vehicles to 90 in. outside width, except buses, which can be 100 in.; exempt from payment of fees fire apparatus, police and hospital vehicles; make alterations of tags a misdemeanor; provide revocation of licenses for improper conduct; require reflectors and dimmers; limit searchlights to left-hand side; require all informations to be under state laws; fix fines for drivers taking part in road races and extend powers of constables to agents of the state highway department. The age limit is raised from sixteen to eighteen years, but no change is made in license fees.

IN NORTH DAKOTA

Bismarck, N. D., March 24—Horsepower basis for motor car taxation in lieu of other taxation and the privilege of the state coming under the provisions of the federal good roads aid act are features of the new highway act. All cars are to be assessed at \$6 each and those with more than 20 hp. will pay 50 cents for each additional power, an owner of a 40-hp. car paying \$16. This will replace the personal property tax.

The act provides a state highway commission and contemplates expenditure of 90 per cent of the receipts from registration within the county in which the tax originates. This is an addition of 15 per cent over the old law. Owners will pay their first taxation under the new law Jan.

1, 1918. For 1917 the receipts will be divided on the same basis as under the new law. A senate bill provides a penalty for larceny of motor cars and motorcycles.

OHIO ROAD LAW UNANIMOUS

Columbus, Ohio, March 24—The action by the general assembly on the White-Mulcahy bill, which passed the house recently by a vote of 101 to 0 and the senate by a vote of 31 to 0 presents a record in the history of road legislation.

The Cass law, enacted two years ago, possesses many excellent features and in the main has been preserved, but the White-Mulcahy bill is designed to correct the errors and supply the omissions in the present law, and greater harmony and efficiency must follow. The bonding sections have been simplified; bids on unit price basis on contracts have been provided for; and aid is given poor municipalities that gaps may be filled in between ends of present improvements that stop at corporation lines. The title "county highway superintendent" has been abandoned, and the office hereafter will be known as that of county surveyor.

The new law provides for establishing a highway advisory board for the state highway department, which will consist of four members, no two of whom may reside in the same county and not more than two of whom may be of the same political party. According to this section the state highway commissioner must receive the approval of the highway advisory board in matters of general policy, particularly with reference to changes in the state system and negotiations for road improvement with the Federal government.

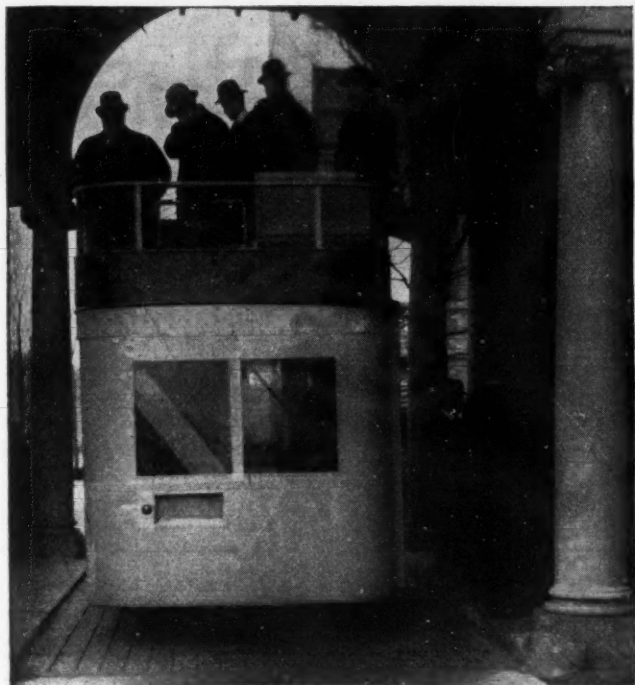
CARRY CHILDREN FROM ROAD

Little Rock, Ark., March 23—Some interesting provisions are contained in a new motor car regulatory bill introduced into the Arkansas legislature. One of them is that if a pedestrian fails to heed the warning of a motorist, the latter must stop and wait until the person walking has gotten completely out of danger; and in case the pedestrian is under the age of 12, the motorist must remove the child to a place of safety before proceeding. Failure to comply with this requirement is only a misdemeanor, it is strange to say, and is punishable by a fine of from \$5 to \$25.

A tax of \$6 for every 20 hp. or fraction thereof is fixed and the sheriff is allowed 50 cents for collection. The speed limit in towns and cities and crowded thoroughfares is 10 m.p.h. and 5 m.p.h. around corners. Physicians are exempt.

ARIZONA ROAD LEVY INCREASED

Phoenix, Ariz., March 23—Arizona will have about \$575,000 in the state road fund this year as a result of the passage by the legislature of the bill levying 10 cents on each \$100 valuation for the state road fund. The new law will almost double the present levy for good roads.



Fifty buses will be operated within a few days on Chicago's Lake Shore drive. They are of the tractor-trailer type, with front-wheel drive from a Moline-Knight 4 by 6, four-cylinder engine

Bus Service for Chicago

Double-Deckers of Detachable Tractor Type Used

CHICAGO, March 26 — Yesterday marked the beginning of operations of Chicago's new motor bus line which gives service from downtown points north on Lake Shore Drive, through Lincoln park to the city limits. The vehicles are huge double-deckers specially built by the Gas Electric Motor Bus Co., New York, and are of the detachable tractor type.

They have a seating capacity of fifty-one passengers, twenty-two in the lower inclosed compartment and twenty-nine on the upper deck. They have a stepless entrance and an inclosed stairway. Heating of the interior comes from the exhaust gases which pass around the edges of the floor in big pipes.

The big trailer which carries the passengers is a product of the St. Louis Car Co., and is coupled with a short tractor in front, being supported on its own two wheels which carry the brakes only, drive being handled through the axle of the tractor which constitutes the front axle of the whole assembly.

The engine is the Knight sleeve-valve type with 4-in. bore and 6-in. stroke and is a product of the Moline Automobile Co. It drives a three-speed selective gearset through a tubular shaft. From the rear of the gearset a sprocket drives a silent chain to a driveshaft which extends to a worm gear on the front axle and from this worm drive is conducted to the front wheels

through universals within the steering knuckle assembly.

There is a complete Bosch starting, lighting and ignition system including a Bosch magneto driven from the timing gears. The starter operates on a gear on the rim of the flywheel through a Bendix pinion. The engine is four-point suspended on a sub frame which is anchored to the front cross member of the main frame and a cross member between the engine and the gearset. There is a Zenith carburetor which receives fuel by gravity from a tank fitted under the cowl. Springs both on the tractor and on the trailer are semi-elliptic.

ITALIAN WAR ROADS

Next week W. F. Bradley, Motor Age war correspondent, who has been driving an ambulance on the Italian-Austrian frontier for more than six months, will tell all about building roads for motor cars and motor trucks in the Italian mountain country where the war is being waged. All the photographs reproduced were taken by Mr. Bradley and have passed the Italian censor. With Italy road-making with an army of 20,000 men was just as important as making ammunition, clothing or rifles. It requires twenty motor trucks in hard service to transport enough ammunition for one big gun.

Fifty buses are to be put into operation within 30 days, and eleven are already in service. The remaining thirty-nine already have been built and are on the way to Chicago. With fifty in operation the buses will run from 3 to 6 min. apart and express and local service will be a part of the system. The buses are manned by a conductor and a driver and will run from 6 in the morning until 1 o'clock at night.

UNIFORM LAW MOVEMENT

Boston, Mass., March 23—More than 300 attended the banquet of the Bay State A. A. this week at which the first gun in a campaign to obtain real reciprocal laws for New England at least and later on for the rest of the country was fired. The plan was outlined by President Teele of the association to have all motor organizations introduce into their legislatures next year a bill to strike out all provisions against non-resident motorists. The men from outside agreed that they would co-operate not only in this but in any other movement for the benefit of motorists.

Among those present at the banquet were Prof. George F. Files, president of the Maine State A. A.; Frederick F. Buxton, president of the Nashua Automobile Club; Prof. David Gallup, president of the Worcester Automobile Club; President George W. McNear of the Massachusetts State A. A.

FRENCH COAL TRUCK A PACKARD

The army truck illustrated on page 14, issue of MOTOR AGE for March 8, hauling coal from the Paris reserve depot to dealers, proves to have been a Packard. The illustration was improperly captioned, probably because our correspondent neglected to "ask the man," etc.

patcher on each side of him had ordered or was about to order. Would we ever get anywhere, or would our travels be clothed with any degree of safety under such a regime? You may say that the parallel is far-fetched, but is it? Liken the traffic officer, who is not to be blamed if he is carrying out the letter of the law as put on the statute books of the city that employs him, to the train dispatcher and think of every car as a train. The traffic officer is the court of last appeal, the director of traffic. If he signals with a blast of a whistle or a movement of the arm who knows what that signal means? A swing of the arm or a lantern on the railroad, the position of the semaphore, has a distinct meaning that holds good everywhere. Why not have our signals that mean so much for the safe movement of traffic in our streets uniform?

We have looked into the matter of trans-continental touring very carefully and know that the main cross-country trails carry a great volume of travel and these tourists are in the dark as to what rule or regulation they must obey when they reach the limits of a town. This brought to mind the thought that standardizing traffic rules by trails would redound to the credit of the trail and at the same time promote the doctrine of safety to a much greater extent.

We have chosen the Yellowstone trail as a fertile field for beginning this concentrated campaign for uniform traffic rules. West of Chicago the Yellowstone trail stretches up through Wisconsin, out across Minnesota and the Dakota prairies, through Montana, a part of Idaho and across Washington. The total mileage from Chicago to Tacoma is 2567 and in that distance one passes through 249 cities, towns and villages. The tourist passes through one town every 10 miles on an average.

Reason for Campaign

It is to combat this situation, to put the officials and all people in general in a more charitable frame of mind toward the tourist that MOTOR AGE has launched a campaign of education as to the needs of traffic regulations. It has not picked the Yellowstone trail as being any more in need of uniform regulations than any other cross-country highway. Ultimately other roads will be taken into the campaign, but we can see where, when the object of the campaign has been brought to a successful culmination—and we have every reason to believe it will be successful in view of the support being given by people all along the road—it will be something of which the Yellowstone can be proud to say that every city and town through which it passes has the same fundamental principles underlying the traffic regulations under which tourists over that highway will move.

CHALMERS IN HIGH GEAR TEST

Chicago, March 27—A Chalmers seven-passenger 6-30 as a part of its 24-hr. non-

motor stop test under A.A.A. rules grid-ironed the Chicago loop this morning in one hour, which means that it covered the six streets running lengthwise in the loop and the eight cross streets, for ninety-six blocks, making thirty traffic stops in that time.

The car with four passengers started the test yesterday at 12.20 p. m. and was driven continuously through the parks and over the boulevard system and much of the time on streets having street car tracks. When the car was brought to a halt at 12.20 the speedometer showed 586.8 miles, or an average of slightly over 25 m.p.h.

Both the low and intermediate gears were removed from the gearset, which left only high and reverse, and the run was made on 42 gal. of gasoline, showing an economy in fuel of 14 m.p.g. Six quarts of oil were used and 2 gal., 3 pts. of water. The test was in charge of L. A. Hillman, A.A.A. representative, and two drivers worked in 8-hr. shifts. Forty-seven minutes were lost in stops for various reasons other than traffic stops. The weight of the car with four passengers was 3815 lbs. In a similar test run in New York recently, the mileage was 358.7. There was no tire or mechanical trouble experienced during the test. Immediately following the test, the car was taken to the speedway for a time trial to determine the effect the 24-hr. grind had on the clutch.

HAVE USED CAR SHOW WEEK

Detroit, March 26—Some of Detroit's largest motor car sales representatives are arranging for an exchanged car week, giving buyers an opportunity to obtain bargains in cars exchanged for new models. The companies interested are the Packard Motor Car Co., Detroit Electric Car Co., Bemb-Robinson Co., Hudson distributor, M. A. Young, Reo distributor, Grasser Motor Sales Co., Hupmobile distributor, Devlin Co., Haynes distributor, and Wetmore-Quinn Co.

110,000 CARS BEHIND

Detroit, March 26—The Ford Motor Co. is 110,000 cars behind its present orders. The company plans the production of the Ford truck sometime in the near future but since it is unable now to produce Ford cars in equal quantities with the demand has put the truck problem to one side temporarily. The company is erecting another plant to augment the present one and probably will be able to meet the demand for its product when this is completed.

HARROUN PRODUCTION SOON

Detroit, March 24—The first of the machinery for the Harroun Motor Corp. plant has been installed. The floors of the manufacturing and assembly buildings have been laid, and as rapidly as these harden the machinery is going into the plant. The floors are being laid from the ends of the T-shaped building, laid out toward the center, and the machinery is

following this up as rapidly as the floors harden enough to form a substantial base. If the weather continues mild manufacturing will probably be under way within the next few weeks, as practically all the machinery is on hand and stored within a few hundred yards of the manufacturing and assembly plant.

MID-WEST TO TALK FUELS

Chicago, March 26—Present-day motor car fuel and how they can best be handled will be the subject of the symposium at the next meeting of the Mid-West Section, S. A. E. at Chicago Automobile Club April 14. Information on available fuels for the next few years will be given by Dr. Burton, vice-president of Standard Oil Co. of Indiana. Discussion on the carburetor man's problem will be lead by F. C. Mock, chief engineer of the Stromberg company, and the engine designs for using these fuels will be discussed by H. L. Horning, general manager Waukesha Motor Co.

FORD WINS BEFORE COMMITTEE

Lansing, Mich., March 23—Henry Ford has won another round in his controversy with Dodge Bros. The senate committee of banks and corporations yesterday decided to report out the bill, which is known as the Dodge-Ford bill, with but one amendment. Instead of making the sky the limit for corporations in the state as the bill asked for, the limit has been placed at \$75,000,000. The amendments which Dodge Bros. sought to have in the bill, providing that a minority stockholder could upset the entire framework of the corporation, were refused by the committee.

PATHFINDER RECAPITALIZED

Indianapolis, Ind., March 23—The Pathfinder Co. has consummated a deal by which it has recapitalized for \$5,000,000 and will greatly enlarge its plant and capacity. The A. R. Scheffer Co., New York and Detroit, broker, has underwritten all the stock, which comprises \$3,000,000 common and \$2,000,000 preferred and will place it on the market. The officers of the company will retain their executive positions. This deal disposes of the rumor at the New York show, when it was stated that the Pathfinder company would merge with another Indianapolis motor car concern. Officials of the company state that such a plan was under consideration but was not accepted.

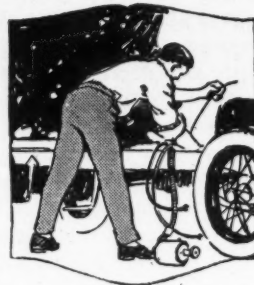
NEW VAN SICKLEN CONTRACTS

Chicago, March 26—The Van Sicklen Co. reports that new contracts for speedometer equipment has been made with the Grant Motor Car Co., Cleveland, Ohio; Velie Motors Corp., Moline, Ill.; Stephens Motors, Freeport, Ill.; Moon Motor Car Co., St. Louis, Mo.; Emerson Motor Co., Kingston, N. Y.; Rock Falls Mfg. Co., Sterling, Ill.; Piedmont Motor Car Co., Lynchburg, Va.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the thirty-seventh installment of a weekly series of articles begun in MOTOR AGE issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors were explained. A section on generator output was followed by one on the purpose and operation of the cutout. The section on Engine and Motor Connection began March 1 and was preceded by one on Electric Motors.

Part XXXVII—Motor and Engine Connection—Drives for Generator

THE function of the generator is to provide a suitable means of charging the storage battery while it is installed on the motor car, thus keeping the battery practically completely charged at all times so that an ample supply of energy is always available for operating the starting motor, lamps, horn and other electrical devices which may be installed originally on the car. In no case should additional electrical equipment be installed upon any car unless you are reasonably sure the capacity of the storage battery is ample to take care of the additional load and at the same time the capacity of the generator is sufficient to keep the battery charged under normal operating conditions.

The generator will not start to charge the storage battery until the electrical pressure generated in its armature is greater in value than the electrical pressure of the battery. The electrical pressure generated in the armature winding of the generator depends on the speed at which the generator is driven, and it will vary directly as the speed at which the armature is revolved if all the other quantities on which the pressure depends, such as the strength of the magnetic field of the machine, etc., remain

constant in value. It is obvious, since the electrical pressure in the armature of the generator depends on the speed, that the battery would discharge back through the generator, if they were permanently connected together, when the speed of the generator happened to be of such a value that the electrical pressure of the generator was less than the pressure of the battery. The function of the cutout is to provide a means of disconnecting the battery from the generator when the battery starts to discharge back through the generator. As explained in one of the previous chapters, these cutouts assume several different forms, some being operated electrically and some by hand.

In order that the electrical pressure in the armature winding of the generator may increase in value as the engine speeds up and the generator starts charging the battery, it is necessary that some mechanical connection be established between the crankshaft of the engine and the armature shaft of the generator. The requirements of this connection are quite different from those imposed on the mechanical connection between the starting motor and the crankshaft of the engine. First of all, the torque required to drive the generator when it is delivering its rated or normal full load will be nothing like as great as the torque the starting motor must develop when it is turning the engine over in starting; hence, the mechanical strains to which the generator connections are subjected will as a rule be less than those imposed on the motor connections. Second, the design and operation of the motor connection in the majority of cases must be such that the motor will be disconnected from the engine crankshaft when the engine starts to fire either automatically or by some manual means. No such requirements need be met in the case of the generator connection, and they are connected in almost every case permanently to the crankshaft of the engine. In some cases, such as in the installation of the Deleo dynamotor, a double mechanical connection is provided, but their construction is such that only one of them is operative at any one time as will be explained later. Third, the ratio between the speed of the generator shaft and the crankshaft of the engine, except in the case of dynamotors with a single drive, is quite different from the ratio between the speed of the motor shaft and the crankshaft of the engine. This difference is due chiefly to the fact that the generator will be connected to the engine all the time and, of

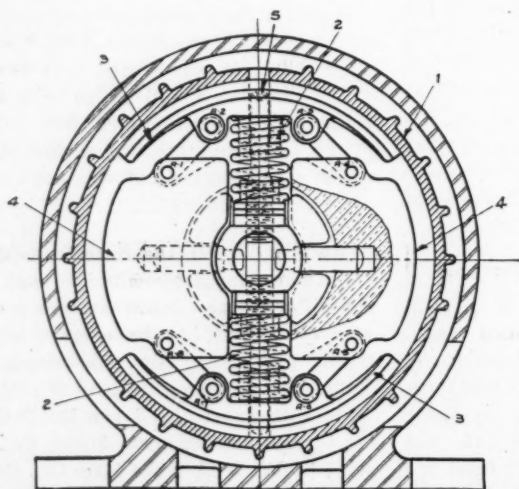


Fig. 220—Sectional view of one form of Gray & Davis friction drive, perpendicular to armature shaft

course, will have to operate under a wider total variation in engine speed than the starting motor.

If the same relation between engine and generator speed were provided as in the case of the motor, the speed of the generator would exceed the allowable limit, and it would be almost impossible to construct an armature and commutator that would withstand continuously the enormous centrifugal forces that would exist at these very high speeds. In the connection of a dynamotor to the engine by a single drive, the gear ratio will have to be lower than the maximum ratio with a double drive to keep the maximum speed down. Fourth, in some cases the ignition distributor is combined with the generator and driven through a gear connection from the generator shaft. In such cases it is absolutely imperative that the position of the distributor arm in relation to the proper firing order of the various cylinders remain fixed at all times, and in such cases it is obvious that the connection between the generator and the engine must be very definite.

Generator connections may be divided into the following main groups and a brief description of one or more typical examples of each kind will be given:

Friction drive.

Belt drive.

Chain drive.

Gear drive.

Mounted directly on engine shaft.

Friction Drive for Generator

A sectional view of the friction drive as used by Gray & Davis on their types E and G-1 generators is shown in Fig. 220, and a sectional view parallel to the shaft of the generator is shown in Fig. 221. The cup-shaped piece of metal marked 1 in both figures is connected to the end of the driving shaft. Two friction shoes, marked 3, are connected mechanically to the end of the generator shaft, so that they may move in or out along pins in the end of the shaft, and held against the inside surface of the cup 1 by coiled springs, 2, which are under compression. Two weights, marked 4, are connected mechanically by four links to the friction shoes. These weights may move perpendicularly to the shaft along pins fastened to the shaft which enter holes in the weights. As the speed of the driving shaft increases, the centrifugal force acting on the weights increases, and this action tends to draw the two friction clutches away from the inside surface of the

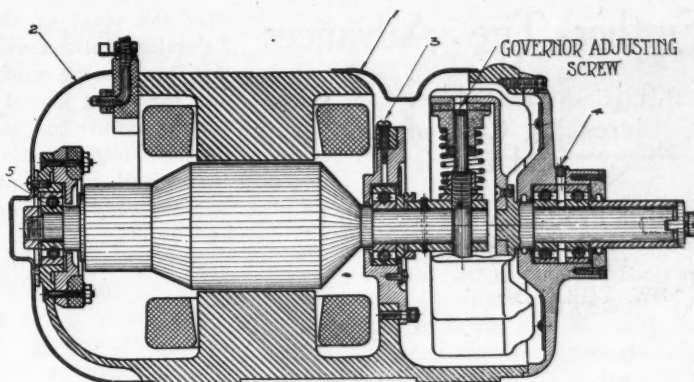


Fig. 221—Sectional view of another form of Gray & Davis friction drive, parallel to armature

cup and thus disconnect the generator shaft from the driving shaft.

The speed of the generator shaft at which the disconnection actually takes place will depend on the adjustment of the two coil springs holding the weights against the inside of the cup. These springs may be adjusted by inserting a small screw driver in the opening 5. When the maximum current output of the generator is to be increased, which amounts to increasing the speed at which the generator shaft is connected from the driving shaft, the screw in the opening 5 should be turned to the right. The governor is very sensitive, and only a slight movement of this adjusting screw is necessary to produce a decided difference in the output of the generator. Just as soon as the speed of the generator decreases a slight amount after the friction shoes are raised from contact with the inside surface of the cup, the centrifugal force acting on the weights will decrease, and the springs will shove the shoes out against the cup and again establish the mechanical connection between the generator and the driving shaft. The total variation in the speed of the generator, when the speed of the driving shaft exceeds the speed for which the generator is adjusted, does not amount to very much, and as a result the electrical pressure generated in the armature winding will rise to a certain maximum value and then remain practically constant for all higher engine speeds.

The small projections around the outer surface of the cup 1 produce a fan-like action which causes a circulation of air through the generator, thus tending to keep its temperature lower than it would otherwise be.

STUDEBAKER SALESMEN MEET

South Bend, Ind., March 26—Salesmen of the Studebaker corporation throughout the United States, with the exception of those covering the Southern territory, were in the city last week to attend the conference that is held annually at the home office of the corporation. Talks were made by officials of the company, among whom were L. F. Reyer, assistant sales manager; John F. Deacon, sales department; A. C. Hill, sales department; Arthur G. Rumpf, secretary of the corporation; D. O. Paulson, sales department; O. S. Barrett, advertising manager; and Edwin C. Witwer, purchasing department. A banquet Thursday evening closed the activities of the week.

POLICY IS UNCHANGED

Indianapolis, Ind., March 24—Officers of The Wheeler-Schebler Carburetor Co. of Indianapolis and Detroit announced today that the recent action of the company in incorporating in both Indiana and Michigan with a capitalization of \$1,000,-

000 in each state means no change in the policy of the company. The company had operated as a partnership until the incorporation papers were filled, Frank H. Wheeler of this city having been the sole owner of the concern since he bought out the Schebler interests about three years ago. The incorporators of the company are Frank H. Wheeler, president; Douglas Wheeler, his son, vice-president, and Sey-

mour Avery of this city, secretary-treasurer and general manager. The last two officers recently acquired stock in the corporation, having been connected with the company for several years.

AUTO PARTS WINS NAME SUIT

Chicago, March 23—The similarity of names between the Auto Parts Co., and the Auto Sales and Parts Co., both manufacturing jobbers and dealers of Chicago, has resulted in the decision by Judge Charles M. Foell of the Superior Court of Cook County in favor of the Auto Parts Co., perpetually enjoining the Auto Sales & Parts from using a name similar to that of the Auto Parts Co. It also was decreed that the Auto Parts Co. has a right to an accounting to ascertain the damages sustained and the profits lost. It is understood that the Auto Sales and Parts in the future will be known as the Auto Needs Co., this change having been made, it is stated, before the decision was rendered. The Auto Needs Co. has appealed.

A NATIONAL WAR MAP

Next week Motor Age supplement will be in the form of a large map showing in several colors the many national highways of the country and also scores of feeding roads that have been opened or improved in the past year. The map will be one of the most valuable in case of war that could be desired. It will show at a glance the great national highways that would have to be used for moving troops, ammunition, guns, etc.

Further Tire Advances

United States Rubber Co. Cites Increasing Cost of Crude and Fabric

Present Production Is 12,000 Tires a Day

NEW YORK, March 22—Another advance in tire prices is imminent, in fact may come within a month, according to Colonel S. P. Colt, president of the United States Rubber Co. This company is now manufacturing 12,000 tires a day and with the completion of its new additions to the Morgan & Wright plant in Detroit, the capacity will be brought up to 14,000 tires a day. An advance in tire prices is only in line with the steadily advancing cost of crude rubber and fabric.

At the present time the U. S. Rubber Co. can turn out rubber from its own plantations in Sumatra at a cost of 17 cents a pound. The same rubber is selling in the open market at 84 cents a pound.

It has 14,000 employes on its plantation in Sumatra. All but 200 of these receive a salary of 15 cents a day. For the same sort of work in the rubber forests of Brazil workers receive from \$1.50 to \$2 a day. About \$10,000,000 is invested by this company in its far eastern plantation. This includes an original investment of about \$8,000,000 and interest charges of about \$2,000,000.

About 15 per cent of its crude rubber needs will be taken care of this year from its own plantations. This percentage will be increased to 25 per cent in 1918. In 1921 the U. S. Rubber Co. should secure about half of its crude rubber requirements from its own plantations, that is, half of the requirements on the basis of present sales of the company, states Colonel Colt.

PACKARD TRUCKS HIGHER

Detroit, March 24—Packard has raised truck prices, effective to-day. The new prices are: 1-ton, \$2,325; 1½-ton, \$2,600; 2-ton, \$3,000; 3-ton, \$3,600; 4-ton, \$4,025; 5-ton, \$4,550; 6-ton, \$4,800. The increase is caused by the higher cost of materials, which have advanced 128 per cent in some instances.

HAS 78 PER CENT INCREASE

Detroit, March 23—The Packard carriage sales board, in its meeting, reported to the Packard Motor Car Co. that it had an increase in business, from Feb. 15 to March 15, of 78 per cent over the same period in 1916. The board is composed of the sales managers of the Packard branches and dealers, established in nine of the principle cities of the country.

MANSFIELD PLANT FOR HALLADAY

Mansfield, Ohio, March 23—The Halladay Motor Car Co. recently capitalized at \$1,000,000, will locate in this city, taking

over the plant of the Baxter Stove Co. Partial operations will start soon, the entire plant for the manufacture of the Halladay car being moved here from Streator, Ill., where the car has been made by the Barclay Motor Car Co.

The Halladay car at present is produced in three body types and markets at \$1,150 and \$1,385 complete. These cars will be manufactured in this city until Sept. 1, when the 1918 models will be produced.

The incorporators of the company are T. E. Huth, Canton; Y. F. Stewart, Cleveland; G. B. Stacey, Cleveland; J. N. Horne, Warren; and Fred Stanley, Sebring. Mr. Huth is general manager.

More than \$250,000 of the capital stock of the company has been subscribed.

PERRIN-FAW SUIT DISMISSED

New York, March 23—The United States Court of Appeals has fully affirmed the decision of the lower court which dismissed the suit brought by N. J. Quinn on behalf of the Perrin no-glare deflector company against the J. H. Faw, Inc., handling the Lennon light protector. The patent involved was No. 1,099,715, covering the construction of a bulb reflector, half of the bulb being covered by a silver coating. The Faw device is a detachable metal covering, and not a coating upon the glass. The element of adjustability also entered into the question. The decision of the lower court was made last July.

250 COLORADO MARKERS

Denver, Colo., March 24—Placing 250 new official markers this spring along Colorado's 550-mile scenic link of the Pike's Peak Ocean-to-Ocean highway will be part of extensive promotion work provided for by the convention just held in Colorado Springs of the Colorado division of this transcontinental motor route. These markers will be of uniform and attractive design and will give substantial service in clearly directing travel along this picturesque road through the Rockies.

The division organization discarded the "Lincoln Highway Association of Colorado" title and will now use exclusively the name, Colorado Division of the Pike's Peak Ocean-to-Ocean Highway Association. The 1918 convention will be held in January, to gain an earlier start for next year's development plans.

YOUR WEEK-END TOUR

Thousands of motorists puzzle as to where they will go for a week-end tour, Saturday afternoon and all day Sunday. Next week Motor Age's sixteen pages of section touring maps of the United States will assist you in this work. Thousands of motorists have helped us compile these maps. They have been in process of manufacture for many months. They will be printed in colors.

Stripped Cars After War

Shipments of Chassis Without Bodies Is Foreseen for This Country

Europe to Start Quantity Production With Peace

NEW YORK, March 23—Quantity production of motor cars in Europe will be in force as soon as peace is declared is the prediction of M. S. Keller, president of the American Motors, Inc., which recently announced a comprehensive export service to makers. Export conditions will somewhat change, one of these being in regard to the method of shipping cars.

According to Mr. Keller, one important change will be in bodies. He believes that most of the cars shipped after the war stops will be stripped of bodies and will go over to the other side only in the chassis. He bases this on the fact that there is such a high tariff on cars with bodies on that the European buyer will demand only the chassis, depending on the body builder in his own country to take care of that detail. With this fact in mind, he predicts that Europe will enter extensively into the manufacture of bodies to take care of this demand.

To Use American Parts

American parts will enter largely into the production of European cars, according to Mr. Keller. Instead of turning out an expensive product, as heretofore, the European factories will invade the medium and low-priced fields, having in view the use of the American standardized parts, turned out in large quantities. There is at present a demand for these parts and several foreign companies, particularly in the Scandinavian countries, are preparing to assemble cars and trucks with these.

To take care of the quantity production European companies are preparing to call on our engineers and efficiency experts to go to the other side where they will be used for their knowledge of American ideas on motor car manufacturing and factory system.

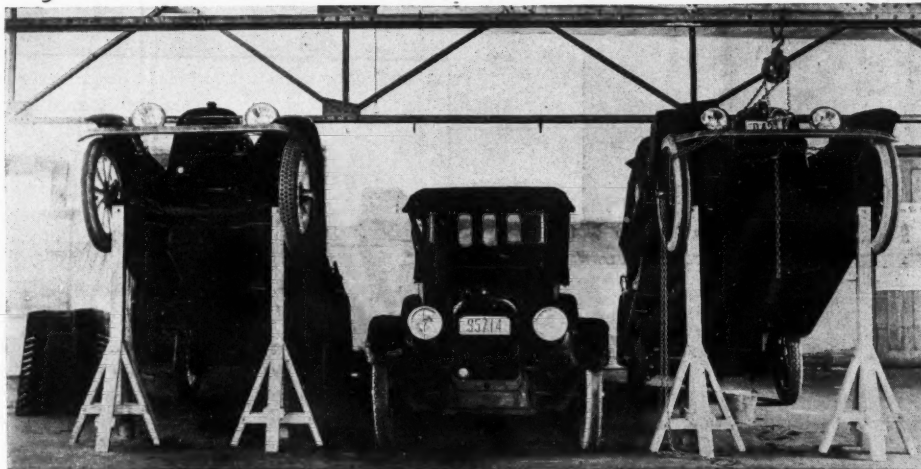
The American Motors, Inc., has foreseen the demand for our parts and has prepared to finance foreign purchasers' shipments, cover payments to the manufacturers, packing, shipping, insurance and such other incidental charges as are requisite in the completion of a shipment of merchandise to any part of the world. This service likewise affects all American makers' shipments abroad.

BRISCOE RAISES PRICES

New York, March 23—The prices of the Briscoe fours and the eight have been raised \$60. The new prices are as follows: 4-24, \$685; 4-38, \$845; and the eight-38, \$1,045.

The Motor Car Repair Shop

Underneath Repairing Without a Pit



In this unique arrangement cars are blocked to a height suitable for underneath repairing and then suspended on huge jacks

THE Chalmers Motor Co., of Minneapolis, Minnesota, has devised and installed a repair system for getting at the under parts of a car, which seems to be the acme of time saving and convenience. The illustration on this page shows the equipment in use. The front end of the car is hoisted up by a tackle block to the proper height and then jacks are placed under it as shown.

When another repairman desires to get at the lower side of another car he can swing the pulley along the rail, lift his car, place it on jacks, and the pulley is ready for another. When on its jacks the car is lifted so that the workman's job is nearly on a straight line with his vision and he has a light, clean space to work in. Furthermore he is within 4 or 5 ft. of his bench and tools. The superiority of this equipment over a pit is seen readily.

According to the Minnesota people the method has proven a big help in satisfying owners, as they are able to give these owners nearly twice as much work in an hour's time than was possible with the pit method, or with the man lying on his back under the car in a dirty and truly uncomfortable position.

Castor as a Lubricant

Increasing numbers of MOTOR AGE readers are asking us for the merits and demerits of castor oil used in its commercial form or combined with other oils into the several branded products which are now on the market. This will discuss pure castor oil. What disadvantages we mention are largely if not entirely offset in the marketed mixtures.

Castor oil is a vegetable oil, and has

much greater viscosity than ordinary lubricating oils which are mineral products. It is on account of this greater viscosity that castor oil has found so much favor for use in racing cars. The high temperatures which are found in engines used for racing require the greatest possible viscosity in order that the working parts may be lubricated with the minimum amount of lubricant getting past the rings. This viscosity at high temperatures also acts as a preventive of leakage of gases past the pistons and rings. Let it be understood that viscosity refers to the sticky, ropy or glutinous consistency of the oil.

Castor oil undoubtedly tends toward greater carbonization than does the ordinary high-grade mineral oil, but this is offset by its better lubricating qualities at extreme temperatures. For ordinary work pure castor is not to be recommended because of this carbonization, and also due to the much greater cost, which would be out of proportion to the advantages gained.

As a further advantage of castor oil it is claimed that due to the smaller amount which finds its way into the combustion chambers as compared with mineral oils, less of it goes to waste by burning, and here is a factor that will in some measure offset the fact that this oil will carbonize quicker than mineral oils.

For motorists who are having trouble with oil pumping, it is suggested that one of the mixtures of castor and mineral oil be tried. Because of its viscosity the oil will have a harder time getting past the rings. For high-speed, high-heat engine jobs the product is especially well fitted.

A special point is made in some sources of the fact that, due to its high viscosity

with light body, castor oil is used advantageously in transmission units, particularly in worm gearing. It has a marked effect tending toward the silencing of the gearing.

Beware! Stale Gasoline

It is not uncommon for a motor car to start on a tour with the gasoline tank filled with a good grade of gasoline and run beautifully for the first 2 days perhaps, or until a fresh supply of gasoline is taken on at some small out-of-town garage or country store. Then, before long, a noticeable loss of power manifests itself in the engine. There is nothing more distressing than the impending gloom of engine trouble. So, think of the gasoline first and you may find the source of that power loss. The trouble caused by poor gasoline is an illusive one and generally gives the inexperienced operator no end of trouble in laying his hands on the difficulty.

The gasoline may be either stale from long standing, may contain water or be of an exceptionally poor grade—stove gasoline as some of them call it.

In trouble of this kind, to facilitate starting one should drain a half to a cupful of gasoline from the float chamber of the carbureter. This will remove water and dirt if it is that which is giving trouble. This should be followed by priming the cylinders with gasoline and then holding a cloth saturated with gasoline over the air intake of the carbureter while the starter is operated. If the engine runs with power on the priming mixture and then dies down to less power when the tank gasoline is being used it is well to assume that the trouble is within the gasoline itself, and the remedy is to replace the gasoline immediately, or if that is not possible to change the carbureter mixture for more gas, until a new supply is available.

You will find some interesting figures on the performance of different grades of gasoline in the article on page 36 of this issue. It does not take a difference of many points in the Baume test to make a considerable difference in the firing propensities of the fuel as you will see by reference to this article.

It is also a strong plea for draining the crankcase. When one considers that in an engine of average design and specifications the crankcase fluid will become 45 per cent gasoline in a very few days running it should be an inspiration to the careful motorist to drain his crankcase and put in fresh oil at least once a month.



The women in the Van Sicklen Co. do sand blast work and clean all parts, among other things. Between fifteen and twenty are employed for this part of the manufacture of speedometers

MORE than 300 women are employed in the manufacture of Van Sicklen speedometers at the factory of the Van Sicklen Co., Elgin, Ill. There is hardly an operation they are unable to do, and in many cases the operation which requires close, careful attention, is done more efficiently by the women workers than by the men.

The men operate all automatic screw machines and die- and gear-cutting machines, but the women run drill presses, stamping presses, do sand blast work and clean parts, as well as work in the assembling department, which requires delicate operation and skill. In fact, only four men are employed in the assembling department. The rest, more than 100, are women.

Fifteen 5-ton presses in the stamping department are operated by women. In emergency cases the women have even run the stamping presses as large as 150 tons. About fifteen or twenty women do sand blast work and clean parts in another department.

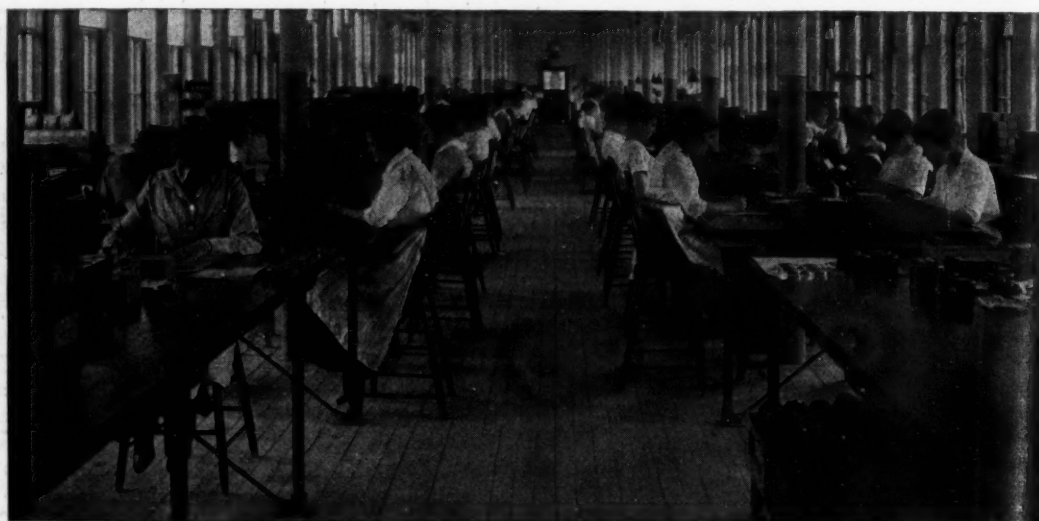
The spray department employs no men. Only white painting is done here, and twenty-one women do that. On one floor in the building devoted to the manufacture of speedometers are 175 women, who are employed mostly in assembling and small machine work. There are few men here.

Women are in charge of the calibrating machines, because the work is very particular and can be done more efficiently with women labor than with men workers. The Van Sicklen speedometer factory is a part of the Elgin National Watch Co.'s factory, but an entire building is given over to the manufacture of the speedometers, and many of the workers are women.

This is the second story on the employment of women in specific American motor car factories and follows other articles on the employment of women in foreign motor car and munitions factories. It is but another phase of the potentiality of the women to-day in the motoring field and allied industries. With the first hint of



Assembling work is done here, and 175 women are employed on this one floor



One end of the assembling department—it is apparent that the women do practically all this work, which is very delicate and takes a good deal of skill. Only four men are employed here in addition to more than a hundred women

Measuring Motor Mileage

By Making Speedometers
for the Motorist's Car

*From the Woman's
Viewpoint*

war threats, the women on the continent organized for her part in the general scheme, and that her part has had to do directly with motor cars to such a marked extent is evidence of her peculiar adaptability to the work.

As repairer and as demonstrator, the woman is still a subject of comment for her doing of the unusual, but in the service she renders as ambulance driver and so on in Europe and as factory worker in the motor industry of this country, she is

fast becoming more of a subject of comment for her doing of the usual in such an efficient manner than for her doing of the unusual.

When one factory, such as the Van Sicklen, whose feminine workers are commented on here, employs more than 300 women and remarks on the better quality of work turned out by them in certain stages of the manufacture, the employment becomes the obvious thing, and the interest lies more in acquaintance with this use of women workers in the industry than in the fact that they are employed.

WOMEN'S SERVICE LIMITED

That the women in various cities who have been taking instruction and practicing to fit themselves as drivers of motor vehicles in case the United States goes to war may not have a chance to give such service has been announced from Washington. The announcement was made to acquaint the women of this fact, as many of them have been thinking that their service as ambulance drivers, in particular, would be acceptable immediately on declaration of hostilities.

Two branches only are open to women at present, according to the war department. These are the hospital and clerical. Women may become nurses or clerks of various grades. No further plans have been made for the employment of women as part of the war program. There will be no women chauffeurs except in the advent of unexpected circumstances. For instance, an expeditionary force may be sent to France, and there may not be enough men for drivers to man it. Invasion from Mexico is another remote possibility that the women drivers may have a chance.

Feminine Motor Notes

The Y.M.C.A. and the Y.W.C.A. of Duluth, Minn., have united to give a course in motor car instruction for women. Inquiries about such a class were received by both associations, and as the women's

organization is in the same building with the men's, the two decided to work together on the course, and enrollments are being taken by both associations.

The course will be under the direction of J. O. Syverston, the regular instructor in the business and professional men's courses. This class has proved popular before among the men of the Y.M.C.A., and it is expected that it will prove as popular among the women.

The women of Knoxville county, Tennessee, have organized a Dixie highway auxiliary. The marble men of the county have agreed to mark the highway at the points where it enters Knoxville, and the auxiliary may offer a prize for the best design.

The Dixie highway has a mile or more edged with crepe myrtle and oleanders as a result of the work of the Pelham, Ga., Civic League.



Most of this work is assembling and small machine operation



These women have charge of the calibrating, or measuring, machines. The work is very particular and can be done more efficiently with women as workers than with men



One end of the stamping department—One woman is operating a drill press and another is running a 5-ton stamping press. This department has fifteen 5-ton stamping presses operated by women. In emergencies the women operate the 150-ton presses

45 Per Cent of Fuel Enters Crankcase Distillation Figures

By H. L. Horning

Engineer and Manager Waukesha Motor Co.

ONE of the aspects of lower gravity fuels which are now being used by motorists is the extent to which fuel not consumed in the combustion chamber leaks down past the pistons. This is aggravated in cold weather and is perhaps slightly aggravated additionally by the use of alloy pistons which are generally made a looser fit than cast-iron types. In some recent distillation analysis of the oil in the crankcase of a motor car, it was found that approximately 45 per cent of it was gasoline or grades of kerosene which had not been consumed in the combustion chamber. The distillation analysis showed that there was only 37½ per cent of good lubricating oil in the crankcase, such oil as is suited for lubrication of cylinder walls and piston rings. This car had had the oil in the crankcase only 9 days and a grade of gasoline testing 58 Baume was used.

In another test of a motor truck in which the crankcase oil had not been changed for two weeks the analysis showed 20 per cent gasoline in the crankcase and an additional 20 per cent of heavier fuels which possessed some lubricating value, leaving but 55 per cent of genuine lubricant in the case.

Conclusions from Tests

These distillation tests of crankcase contents suggest that in the winter season it is very imperative that crankcase lubricant be frequently changed if the best results are going to be had from the engines. It is necessary in the average passenger car to change the lubricant every 2 weeks. In motor trucks it should be changed once a week. In tractors the change should be made every 2 days.

These facts suggest the necessity of a wider use of what is known as the distillation curve in gasoline. As brought out at the meeting in Washington some months ago where fuel was discussed, the term gravity has little meaning. The really essential consideration in a fuel is distillation.

Fig. 1 shows the distillation curve of two grades of gasoline used in the tests referred to. A few words of explanation on how to interpret a distillation curve may be necessary. Curve K shows the distillation curve of a 62 Baume gasoline. This gasoline was used in the motor truck in which 20 per cent of the crankcase lubri-

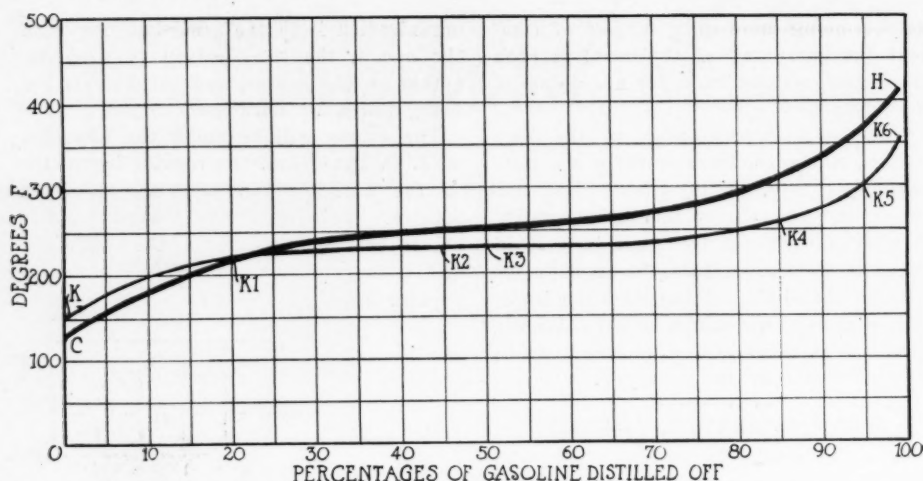


Fig. 1—An interesting chart showing percentages of gasoline distilled off at various degrees of heat. Curve K represents 62 Baume and curve C shows 58 Baume gasoline

cant proved to be of this fuel. Starting at the left end of this curve the point K shows that this gasoline started distilling or vaporizing at a temperature of 150 deg. F. The point K1 on this curve is known as the starting point. The curve shows that at the point K1 the temperature is 220 deg. as shown by the figures in the left column, and at this point 20 per cent of the gasoline had passed off in vapor as indicated by the percentage figure along the bottom of the chart. This is what engine designers consider an ideal performance of fuel for starting purposes. In other words, any gasoline that will distill 20 per cent off at 220 deg. F. gives good starting. For this reason the part K-K1 is known as the starting zone of the distillation curve.

Let us follow the curve from point K1 to the right. The curve proceeds almost horizontally, which is a good indication, and means that this gasoline continues to distill off at reasonably low temperatures. This means that too much heat is not necessary to convert it into a vapor. If we follow the curve we find at K2, which is a temperature of 245 deg., that 45 per cent of the fuel has distilled. Pass K3, which is 250 deg., and we see that half of the gasoline has been converted into vapor. Continuing to the right point K4 shows that 85 per cent has been converted into vapor and the temperature has not reached 300 deg. The last part of the curve, from K5 to K6, shows that the temperature had to be increased very rapidly and even then but little of the remaining gasoline was distilled off. The final point of the curve, K6, is known as the end point. It indicates that the temperature was 355 deg. and that at this point 98 per cent of the gasoline had passed into vapor. The test was stopped here, because the remaining contents were largely heavy parts that would not yield any fuel. The point K6 is known as the end point of the distillation curve.

For comparative purposes we are showing another curve C which is that of the gasoline used in the passenger car in the crankcase of which it was discovered that

45 per cent of the contents were gasoline, or combinations of what might be called gasoline and kerosene, in other words, fuels rather than lubricants. This has a 58 Baume fuel. Analyzing this curve through it will be noted that the starting point C at the left end is lower than that of the curve A. This means that the gasoline started distilling at a temperature of 135 deg. F., or lower than the other curve. The gasoline contains some highly volatile constituents which rendered it particularly good for starting as these contents would vaporize at a low temperature and give the necessary explosive mixture. If we move along this curve to the point K1 we see that at a temperature of 220 deg. just 20 per cent of the fuel had distilled so that for starting purposes this fuel might be considered a little better than the one shown in curve A in that it has the lower starting point.

Distills at Higher Temperature

If we trace the curve B to the right from point K1 we will find that it rises higher or is above the curve A. This means that the gasoline distills off at a higher temperature. In other words it means that more heat is necessary to distill it. If you pass to the end point of the curve, marked H, we see that it shows a temperature of 420 deg. which is much higher than that necessary for curve A. At this point not so much of the gasoline had distilled off. In other words there was a greater residue of practically useless matter remaining.

By comparing the curves A and B it is readily seen that curve B represents a gasoline which will not be so thoroughly consumed in the combustion chamber as that represented by curve A. Naturally more heat is required for the curve B gasoline, and if this heat is not present there will be a greater condensation of the gasoline in the intake pipe, a less complete burning of it in the combustion chamber, and naturally more of the gasoline working down past the piston rings into the crankcase. The fact that this gasoline in

(Continued on page 38)



The heavy Seagrave truck which uses an eight-cylinder Herschell-Spillman engine of 33.9 hp.

Seagrave—First Eight-Cylinder Truck

3½-Ton Car Has Complete Electrical Equipment

THE Seagrave 3½-ton truck embodies a Herschell-Spillman eight-cylinder engine. This rather uncommon application of an eight-cylinder engine to a heavy truck has as its purpose great flexibility at low operating speeds together with even torque under heavy pulling conditions which is, of course, impossible with an engine having a smaller number of cylinders.

Although the price is not announced, it is to be assumed that the price of this truck will be rather higher than for other trucks of the same capacity, due to the use of an expensive engine and a sacrifice of cheap construction throughout. The truck is built for extensive and severe service and will appeal to those buyers who will pay for the ultimate.

Equipment of Engine

The engine is of the V-type and has a bore of 3¼ in. and a 5-in. stroke, giving an N.A.C.C. rating of 33.9 hp. It is regularly equipped with Westinghouse starting, lighting and ignition. The engine internals include a drop-forged nickel-steel camshaft carried on steel reinforced die-cast babbitt bearings, and helical timing gears for quiet operation. Lubrication is force feed from a gear pump and an oil reservoir at the bottom of the crankcase. The feed registers through an indicator on the dash. The oil drains back into the pan, which forms half of the crankcase. Pistons, connecting rods and camshaft bearings receive lubricant by splash.

The engine speed is governed by an automatic instrument which operates on a special valve above the carburetor independent of the hand and foot throttle. The

engine is cooled by a shaft-driven centrifugal pump, a gear driven fan and a tubular radiator of large capacity with cast-iron top and bottom tanks and side frames rigidly bolted together, supported and cushioned by springs. The entire radiator can be taken apart easily.

In unit with the engine is a multiple-disk dry plate clutch, entirely inclosed. The gearset behind is of the selective sliding type with three speeds forward and a reverse. This is also carried in unit with the engine. All the gears have a 1-in. face.

Drive is through a solid chrome nickel-steel shaft. This shaft is in two pieces with three universals and is supported in the center on a self-aligning ball bearing. This construction prevents whipping and consequent vibration, which might be found in one long shaft.

The front axle is a worm-gear, full-floating type with heat treated chrome nickel steel shafts. The shafts have separate driving flanges which bolt to the hubs and

are splined to fit the differential. Timken tapered roller bearings are used throughout. The weight of the truck is carried on heavy steel tubes which are forced under hydraulic pressure into a strong central cast-steel housing. The worm, which is mounted above the worm wheel, and the worm wheel and differential are mounted as a unit in a cast-steel carrier which is bolted in place in the central housing of the axle. This design permits quick and easy assembling and dismounting of the worm, worm wheel and differential and their removal without taking the axle from under the truck.

Two Brake Sets

There are two independent double-acting sets of brakes of the duplex type, consisting of four Raybestos-lined brake shoes expanding in a pressed-steel drum on each rear wheel. The two opposite shoes in each drum are service brakes operated by pedal and the other two are emergency brakes operated by hand lever. All brake shoes are interchangeable. The brake rods are so arranged that when the service brakes become worn the emergency brake shoes can be used for service brakes by simply crossing the brake rods.

Springs are semi-elliptic, 40-in. long and 2½-in. wide in the front and 54-in. long and 3½-in. wide in the rear. They are made of vanadium steel with bronze bushed eyes. Tires are 36 by 5 single on the front and 36 by 5 dual on the rear. The endless solid type of tire is used.

Wheelbase is 156 in. and the front tread is 61 in. and the rear 66¼. The length of frame behind the driver's seat available for loading is 12 ft.

OVERLAND PRICES INCREASE

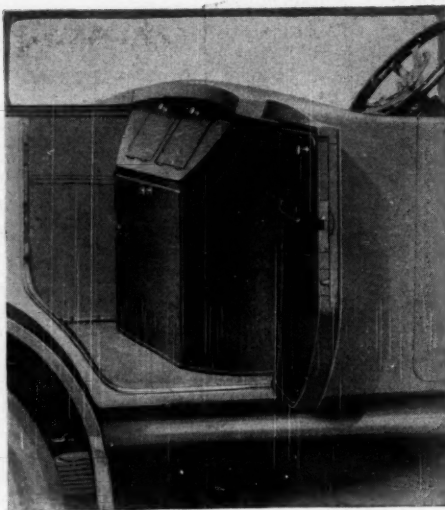
Toledo, Ohio, March 24—The Willys-Overland Co. will increase its prices, to take effect April 1, as follows: The light four touring car, now \$665, will be \$695; the roadster, now \$650, will be \$680; the country club model, now \$750, will be \$795; the Willys-Knight four, now \$1,285, will be \$1,395; the light panel delivery, now \$700, will be \$730; the light express delivery, now \$675, will be \$705. Models 85 in the four-cylinder and six-cylinder will be increased in price May 1. These prices will be announced later.

National Four-Passenger Phaeton

THE toy tonneau type of body construction so much in vogue several years ago is returning in a more up-to-date form in long, low and racy appearing cars. One of the newest types which would answer this description is the National Highway sport phaeton, product of the National Motor Car and Vehicle Corp., Indianapolis, Ind.

The body style is furnished in both the six- and twelve-cylinder chassis, with the former priced at \$1,850 and the latter at \$2,250. The body is straight side with rakish lines and tilted windshield. It is long and narrow, yet roomy and comfortable. The front seat is one piece and cushion in front with a body-fitting back in the front of the broad center cowl. The rear seat is deep, and being nearer to the car center than in most touring cars, is comfortable when touring.

A novel feature is the handy Newport cabinet in the tonneau which fits the phaeton for extensive touring. The cabinet is divided into three sections. The two small-

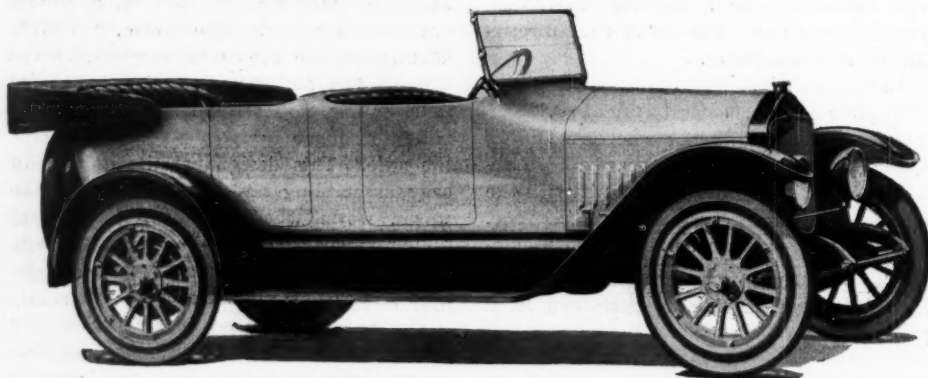


The Newport built-in luggage compartment on the new National sport phaeton

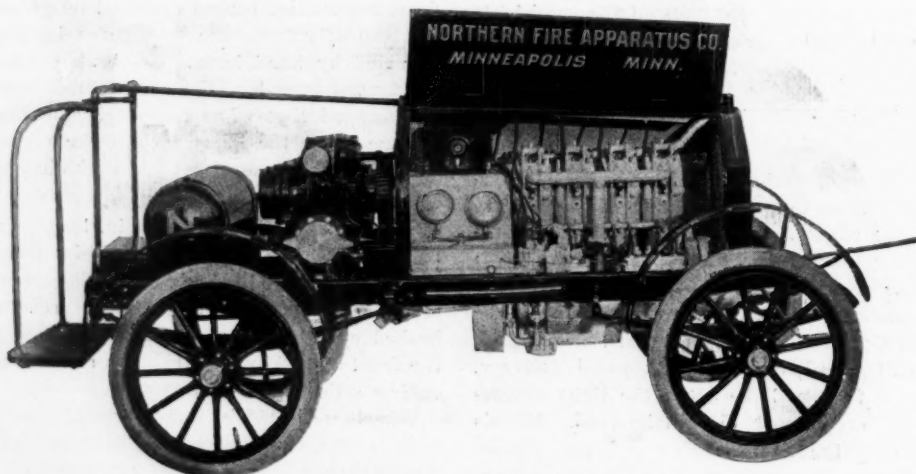
er ones open from the tonneau dash, which is walnut, the same as the dash in front. Below is a larger compartment designed to accommodate a full-sized suit case. The sides of the Newport cabinet are covered with black leather to match the upholstery.

GABLE WITH HUDSON

Detroit, March 23—Jack Gable, who was a mechanic for the late Bob Burman, has been added to the racing team of the Hudson Motor Car Co.



The four-passenger National sport phaeton furnished on the six- or twelve-cylinder chassis



The Northern trailer pump with 30 hp. engine-driven pump capable of delivering 410 gal. per minute

Northern Fire Apparatus Trailer

A NOVEL type of fire apparatus is embodied in the Northern trailer pump recently placed on the market by the Northern Fire Apparatus Co., Minneapolis, Minn. It consists of a gasoline engine geared direct to a high efficiency Northern rotary fire pump. The mechanical assembly is mounted on a light-weight four-wheel trailer chassis.

The apparatus is a single-duty fire pump. It is to be coupled to the rear of any other fire apparatus and trailed to the desired fire hydrant where it is uncoupled and left in charge of the engineer who rides on its rear step.

Advantages claimed are low price, light weight, saving of time in getting water on the fire and small cost in getting it to the fire. The pump is manufactured by the Minneapolis concern under the Pagel rotary pump patents.

The engine, which is used for pumping purposes only, is a four-cylinder with 30 hp., N.A.C.C. rating. The claim is that it will pump 410 gal. per minute against 135 lb. pump pressure drafting water 12 ft. The manufacturers state that they are prepared to quote on three sizes and capacities for prompt delivery.

Distillation Figures

(Continued from page 36)

curve B requires more heat explains why 45 per cent of the crankcase lubricant was of this fuel, whereas only 20 per cent of the crankcase lubricant was of the fuel indicated in curve A. It is highly probable that the motor truck using fuel A was working more constantly with perhaps a higher engine temperature than the touring car using the fuel at curve B. A motor truck carries its full load perhaps 45 per cent of the time whereas a touring car carries its load but 15 per cent of the time. From this it might be assumed that the conditions under which the motor truck worked were more favorable to good fuel consumption than those under which the touring car worked. Added to this might be the fact that the touring car used pistons of a looser fit.

From these curves it can be readily seen that more scientific information is necessary in connection with motor fuel. The oil refiners are doing their utmost to supply satisfactory fuels, but notwithstanding this it is desirable to make such frequent changes of crankcase lubricant as was suggested at the start of this communication.

Lewis Motors Is Ready with a Six Engine

THE Lewis Motor Corp. of Detroit has begun production of a six-cylinder engine which has already passed through a long experimental stage. The engine is of block design with the crankcase integral with the cylinder block. In fact, the built-in features are noticeable throughout the entire design of the engine. Outside and accessory parts seem to have been eliminated wherever possible so that the engine presents a very clean appearance.

The crankcase has been carefully ribbed and all bearing brackets are strongly supported in the case to prevent any possible distortion from crankshaft deflection.

The crankshaft is of the inherently-balanced type, where the forging is so designed as to carry its own counterbalance. The Lewis crankshaft is 2-in. in diameter and all bearing surfaces are liberal. The connecting rods and reciprocating parts are light in weight so that, considering this with the counter-balancing feature, vibration is a small factor.

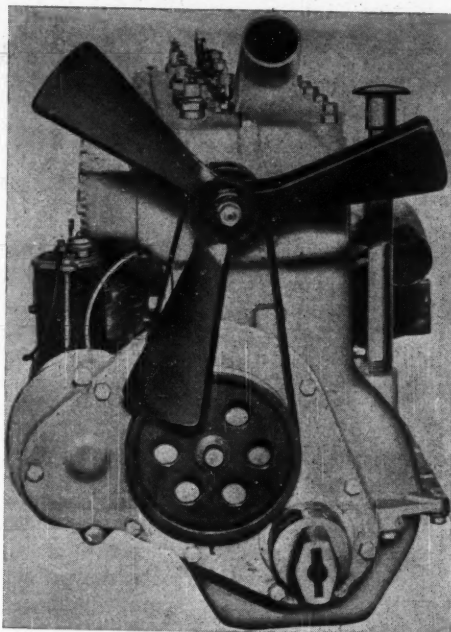
The cylinder head is of the separate-cast type and contains cored passages for water on the valve side of the head as well as on the opposite side, thus overcoming the difficulties sometimes found in separate dead engines where the valve seats become distorted from uneven cooling.

Alignment Carefully Provided

The flywheel housing at the rear of the engine is bolted to the crankcase and careful provision for alignment is made by means of dowel pins. The oil pan is provided with a flange which bolts directly to the bell housing. This makes a rigid support for the bell housing, and at the same time provides an oil-type seal at the rear of the oil pan.

The engine is now made in 3½ to 5-in. cylinder size. The valves are unusually large, being 1¼-in. outside diameter. The gas flow has been carefully considered and the manifold design is unique. A combustion type of intake and exhaust manifold is embodied. The manufacturer claims that the better heating provision of the combination manifold makes certain that fuel is broken up thoroughly and enters the cylinders as a dry gas. This feature tends toward rapid acceleration and freedom from missing when starting in cold weather.

The engine is lubricated by combination pressure and splash. The pressure pump forces the oil through concealed leads inside the crankcase to the various bearings and then back to the pump through oil



Front view of compact six-cylinder Lewis engine showing two-blade fan

troughs where the lubricant is picked up by the connecting rods.

A feature of the engine is the method of mounting the starting and lighting system by means of piloting directly into the crankcase opening instead of by means of brackets. This provision assures correct alignment of shafts, making everything oil tight, and prevents any oil leakage around the instruments. The engine has been designed for application to the moderate-priced, six-cylinder car.

11,000 EMPLOYEES BUY STOCK

Akron, Ohio, March 23—More than 11,000 employees of the Firestone Tire & Rubber Co., 90 per cent of the persons employed, have made use of the opportunity to buy stock of the company. Stock was sold to employees below current quotations on an easy payment plan described in a previous issue.

Standard Body on New Ohio Electric

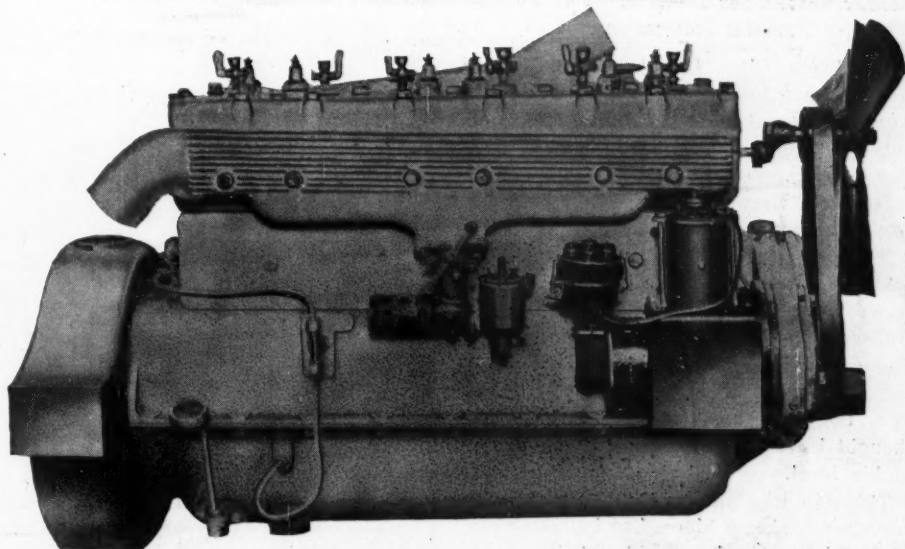
THE Ohio Electric Car Co., Toledo, Ohio, is ready with its new model 44 car. This is an attractive coupe model which differs from the models 43 and 66 in that it is a stock car throughout, whereas the others are custom built. It is built on the same chassis as the others, the only difference being in the body. The price is \$2,380.

The chassis incorporates all the features that have made the Ohio distinctive, foremost among which are the suspension of the motor on semi-elliptic springs on the chassis frame and the use of magnetic control. The control has been somewhat improved by the provision of a removable plate which permits access to the contacts for cleaning, etc.

Three Body Options

Whereas the two older models may be finished in almost any color and upholstery combination at the option of the purchaser, but three choices are given with the model 44. The body may be finished in green, gray or blue with upholstery to match. Wheels are either wire or wood at the option of the purchaser and tires may be either 33 by 4½ Goodrich Silvertown cord or Motz cushion.

There is a further option in the speed capabilities of the car. It may be fitted with batteries which will give a maximum speed of 28 m.p.h., or batteries which will give a maximum of 20 m.p.h. Standard equipment is 40 cells of 15-plate Philadelphia. The wheelbase is 103 in.



The inlet and exhaust manifolds of the Lewis engine are so joined together that the incoming gases are thoroughly heated

fection of the engine this cost me about \$8 for iron. I used galvanized iron although this works up hard; but it can be done neatly. The top is a protection for mud; same cannot be put down. I used the cushion and leather out of the old body; same is buckled with a strap over the back edge of the rear seat so as to allow access to the gas tank.

I am using this car for 1/2-mile track work for the coming season. I have lightened the present piston and have put on a Bosch magneto and a Master carbureter, and I believe the car is good for an easy 60, but I am putting in a set of very light Gray iron pistons and raising them 3/8-in. and also a special camshaft. This job costs me about \$100.

I have put on a pan the full length, which meets the rear end of the body; there is no dash or foot boards, but if I use it for road work I will arrange so that I can apply them. I have used heavy strap iron throughout the body to give strength. My oil tank is built in the dash.—G. R. Jansen.

THE TIRE PRESSURE ARGUMENT

When the Tire Strikes an Obstruction the Pressure Increases

Gibbon, Okla.—Editor MOTOR AGE—I have had some discussion lately in regard to the varying pressure in a tire, and would like to have your opinion of same.

Some argue that the pressure remains the same in the tire upon striking an obstruction sufficient to force the sides of the tire together, or rather to the rim, others say that the pressure is the same in the tire and could not be changed by striking the tire with a sledge hammer. Who is right and why?—A. S. Dotson.

The pressure within the tire is increased when an obstruction is encountered. The reason for this is that the air-holding volume within the tire is decreased by the depression caused by the blow, and quite naturally when the same amount of air is compressed into a smaller space it is under higher pressure. Blow up a toy balloon and the walls will hold the compressed air within. Compress those walls with your

fingers and the balloon will explode due to the fact that you increased the air pressure within the balloon by pressure. It is the same principle.

WANTS DROPPED FORD FRONT AXLE

Has a Magneto to Exchange for a Bosch Paying Difference

Walcott, Ark.—Editor MOTOR AGE—Where can I purchase a front axle for my Ford racer like the one illustrated by E. B. Williams in MOTOR AGE March 1, page 35?

2—What would be the proper size aluminum alloy pistons for a Ford cylinder bored to take the regular cast iron pistons .03125 oversize. I want them to fit so they will not be noisy. Can this be done?

3—Would a faster camshaft and larger valves be as efficient for ordinary road use as the ones furnished by Ford?

4—Where can I exchange my slightly used Splittorf high-tension magneto for a new Bosch dual system by paying the difference in price?

5—Where can I purchase a good oil pump outfit for pumping oil from oil tank to the crank case of my Ford racer?—W. M. Majors.

1—MOTOR AGE knows of no one manufacturing such an axle. It is either a job of hand forging from suitable alloy steel

or of rebuilding a dropped axle from some other make of car.

2—The usual practice is to leave a clearance of .005 in. They should not be noisy if properly fitted.

3—Yes; for the valves, probably not so much for the faster camshaft when pulling at low speed.

4—See the Advertising Clearing House section of this issue.

5—At any motor car supply house.

CORNELIAN GEARSET DESCRIBED

Pinion Breakage Done Away With By Reinforcing

Norfolk, Va.—Editor MOTOR AGE—When and where was the Cornelian car that entered the Indianapolis race built?

2—Was it a stock car?

3—If not, please give ratio, h.p., etc.

4—What is the ratio of the stock car, and what speed will it travel?

5—Give me any available information about the gearset on this car; the one I have persists in stripping pinions as fast as they are put in. Explain how this transmission is operated, and how it should be assembled?

6—How can a person that can do pen drawings of cars, parts, illustrated news, or anything pertaining to motor cars obtain employment?—R. M. Peteway.

1—Blood Brothers Machine Co., Allegan, Mich.

2—Stock design specially built for racing.

3—The horsepower was 14, the gear ratio 3 1/2 to 1.

4—The stock car ratio was 4 1/2 to 1. There were no official records of its speed, although it was in the neighborhood of 55 m.p.h.

5—This gearset is operated by a large internal gear rocking into two small external pinions and a dental clutch for direct drive on high gear. The internal gear surrounds the two externals. By rocking it to one side it meshes with the reverse gear and by rocking it to the other it meshes with the low gear. Then by pushing the internal gear assembly back, with the internal gear running free, the dental clutch is engaged and direct drive is given for high gear. The pinion stripping could undoubtedly be done away with if you would find some way to reinforce the gearset case. It is the wearing of this case which strips the pinions.

6—If you are a draughtsman you can obtain employment in Detroit without trouble. The Detroit papers, in the classified advertising sections, have continual calls for such men.

Monroe Wiring Diagram

Flint, Mich.—Editor MOTOR AGE—Give a diagram showing the wiring on a Monroe Model 16.—L. F. Smith.

The diagram you ask for is published in Fig. 2.

To Lower Ford Steering Post

Maple Park, Ill.—Editor MOTOR AGE—Illustrate how some owners of rebuilt Fords lower their steering post, and do they substitute a 1911 post which is longer?

2—Could I use only two non-leaking rings on a Ford piston and, if so, where?—G. D. Howard.

1—It is simply a matter of dropping the post and readjusting the steering arm and connections. There is no need of its be-

Inquiries Received and Communications Answered

E. C. Meyers.....	Big Sandy, Mont.
A. S. Dotson.....	Gibbon, Okla.
A. S. Heaney.....	Oklahoma City, Okla.
R. M. Peteway.....	Norfolk, Va.
G. R. Jansen.....	Manson, Iowa
W. M. Majors.....	Walcott, Ark.
C. C. Chase.....	Buda, Ill.
Old Subscriber.....	Hamilton, Ohio
Ire Hayes.....	Eckford, Mich.
C. A. Donaldson.....	Nogales, Ariz.
A. Reader.....	Gainesville, Tex.
John McNutt.....	Little Rock, Ark.
Homer Bodurn.....	George, Iowa
John Threlfall.....	Mayfield, Kan.
J. H. Humphrey.....	Sinsbury, Conn.
K. A. Bergenthal.....	Milwaukee, Wis.
Ernest Spiegel.....	Kewanee, Ill.
R. J. Weber.....	Chicago
T. L. Morgan.....	Rome, Ga.
D. H. Jones.....	Fairfield, Mont.
Frank J. Potts.....	Barberton, Ohio
L. F. Smith.....	Flint, Mich.
A. Reader.....	Calamus, Iowa
Miles Gibson.....	Youngstown, Ohio
George H. Pannell.....	Los Angeles, Cal.
Walter Burnham.....	Industry, Ill.
Kay Rehnberg.....	Emporium, Pa.
James Garman.....	Bailey, S. D.

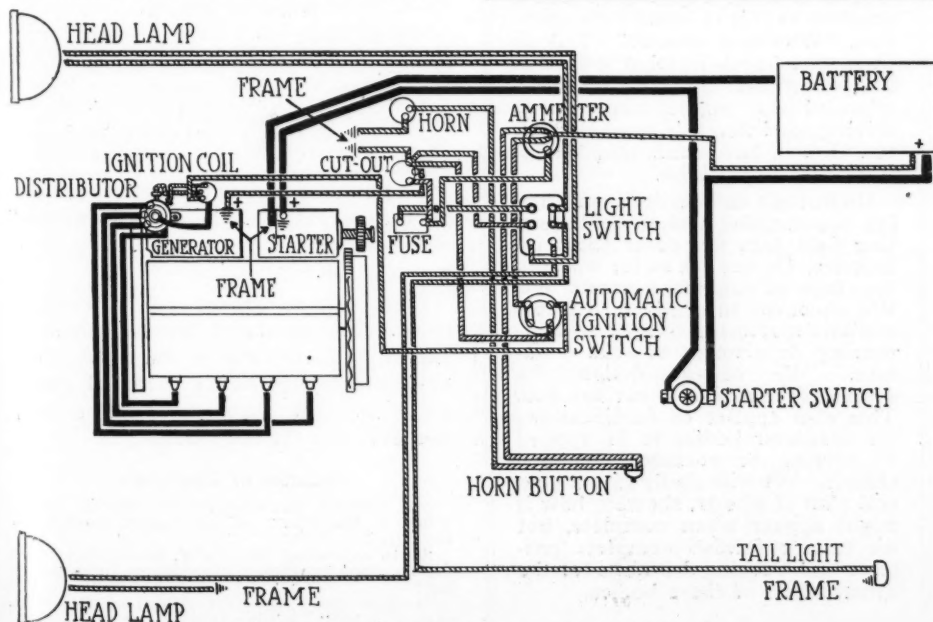


Fig. 2—Wiring diagram of Model 16 Monroe

ing longer, as the seat can be located to fit the driver when it is dropped.

2—Use the two rings in the top grooves.

CARBON DEPOSITS — PRE-IGNITION

Possible That Small Amount of Carbon Raises Compression

Buda, Ill.—Editor MOTOR AGE—I have an Apperson 4-45, 1912 model which knocks very badly whenever there is the slightest carbon deposit in the cylinders. This necessitates frequent scraping and even though the amount of carbon cleaned out each time is very small, it seems to cure the engine of its knock for the time being. I have checked up the timing, and it is correct. Also the bearings are tight. Is it possible that the slight amount of carbon in the combustion chamber raises the compression, which is already very high in this engine, enough to cause pre-ignition?

2—If the compression of this motor is too high, what thickness of fiber gasket would you suggest be placed between the crankcase and cylinders?

3—Also what effect would lowering the compression have on the general efficiency of the engine?—C. C. Chase.

1—It is very possible that it might.

2—This is something you would have to experiment with. A gasket $\frac{3}{8}$ -in. thick would make considerable difference.

3—Lowering compression would reduce the power. The extent of this reduction would depend on the thickness that the gasket would have to be. It would probably make very little difference, however.

WILL USE OLD MARMON AS RACER

Tapering of Cams Might Help Speed Somewhat

Milwaukee, Wis.—Editor MOTOR AGE—I am considering entering a 1911 model 32 Marmon car in some 1-mile dirt track races this spring. I intend to have aluminum pistons fitted. Does MOTOR AGE advise any change in the valve or ignition timing? Would the tapering of the cams help the speed to any great extent? Where on the engine do you advise attaching the oil lead from the auxiliary hand pump? The car at present is geared 3 to 1 with 34 in. wheels. How much higher gearing would be advisable for this work and where could such gears be secured?—K. A. Bergenthal.

It might be well to set the ignition timing ahead one tooth. There is no need of changing the valve setting. MOTOR AGE has no data concerning the standard taper on these valves. If they are flat topped with a slow lift and drop, it would undoubtedly be a help to taper them for quicker opening and closing. The oil lead will attach to any convenient point on the side of the crankcase, preferably at a point where the oil will drop unimpeded into the pump. The car would very likely stand $2\frac{1}{2}$ to 1 for 1-mile dirt track work. Special gears might be procured from the Marmon factory. At least the makers can advise you where to go for them.

OIL LEAKS FROM TIMING GEARS

Directions for Removing End Play in Buick Driving Yoke

Hamilton, Ohio—Editor MOTOR AGE—I find it almost impossible to keep the timing gears of my 1914 Buick B-37 properly lubricated, as the oil, even though it be of a consistency approaching that of hard oil, persists in leaking out from around the pulley that drives the fan. Is a washer of some kind used to keep the oil in? If so, how can the trouble be remedied. Is the pulley easily removed from the end of the camshaft which drives it?

2—What means is employed to keep the timing gear oil from working its way around the crankshaft and also the camshaft and entering the crankcase? How is the oil kept from seeping out of the timing gear case from around the crankshaft at the point where it protrudes through the timing gear case?

3—There is considerable play at the point where the yoke on the front end of the torsion tube attaches to the swivel arrangement, which in turn attaches to the transmission case. This is especially noticeable when the car is running very slowly and begins to buckle. How can this looseness be adjusted?—Old Subscriber.

1—Leakage of oil from around the fan pulley on the Buick model B-37 engine may be due to: First, use of too much engine oil; second, endeavoring to fill the pumpshaft bearing with engine oil through the right-hand wing plug; third, to improper adjustment of the main bearing which allows the engine oil to work forward through this bearing into the timing gear case. In any case we would suggest that you take this car to the nearest Buick dealer where you can have these pieces carefully examined.

2—The front main-bearing shims, when fitted at the factory, are set up tightly against the crankshaft journal to prevent any engine oil from working forward into the timing gear case, but if removed by an inexperienced repairman, they may be left

IN WRITING AN INQUIRY to the Readers' Clearing House Department

DESCRIBE THINGS COMPLETELY!

If your car is giving trouble, tell us all about the trouble and what you have done to try to remedy it. Always bear in mind that we are not looking at your car when we are reading your inquiry. Try to picture everything to us as we might see it if we were looking at your car. You understand it. Make us understand it.

Do not write in and say, "My engine has developed a serious knock. What is the trouble and how can I remedy it?" It is as impossible to give an intelligent answer to such a question as it is to answer the question, "Why is a mouse?" Tell us where the knock is, what it sounds like, what effect it has on the operation of the engine, under what driving condition it is most evident, etc. Let us have some tangible information to work on.

Do not ask us questions concerning motorcycles and motor boats. Our field does not cover these industries. Do not ask us for working drawings of engines, gearsets, etc. We endeavor to conduct an information department, but not an engineering department of such a nature. We cannot design the mechanical units of a car for you. This also applies to specifications for speedster bodies to be applied to touring or roadster equipped chassis. We will gladly give a general plan of a body, showing how it might appear when complete, but we cannot furnish complete patterns and working drawings for the construction of these bodies.

too loose, which would result in the trouble you mention.

3—End play in the driving yoke may be removed by tightening the adjusting collar on the forward end of the propeller shaft housing.

EFFECT OF FORD OVERHEAD VALVE

Approximate Power Increase of 15 Per Cent with Iron Pistons

Nogales, Ariz.—Editor MOTOR AGE—Discuss in MOTOR AGE the effect in increase of power and piston engine speed, and any disadvantages if overhead valves and aluminum pistons were installed in the Ford engine.—C. A. Donaldson.

Tests have shown that in the aggregate an engine with overhead valves will produce approximately 15 per cent more power than an L-head engine, considering that the bore and stroke and general design of reciprocating parts are the same. This is based on the supposition that both use the same kinds of pistons. Were a Ford engine to be equipped with a PROPERLY DESIGNED overhead valve mechanism and aluminum pistons, it might be safe to assume that the aggregate power increase would be 25 per cent or more. It would be quite impossible to approximate the increase in engine speed. However, if the car were to be equipped with 3 to 1 gears instead of the standard gearing, and the power gained enough to maintain the same maximum engine speed as with the original engine, the following results would be obtained:

With the standard gearing it is a fair estimate that the maximum car speed is 45 m.p.h., and assuming that the car is equipped with 30-in. wheels the engine speed will be approximately 1750 r.p.m. Now consider the engine equipped with an overhead valve mechanism which will maintain this engine speed with a gear ratio of 3 to 1. The car would then have a maximum speed between 55 and 60 m.p.h. This is a very conservative estimate all the way through.

Wants to Repaint

Crystal Lake, Ill.—Editor MOTOR AGE—My car, which is 1914 model, was revarnished in 1915, is now getting to look quite aged from the paint scaling off in patches clear down to the metal base. Can I repaint it myself and do a fairly satisfactory job?

2—How can I get the old paint and varnish off so the finished job will look smooth?—H. V. Fulton.

1—Yes. There are several paint kits on the market which contain everything which is necessary to complete a good painting job.

2—It can be ground off with emery paper. The job should then be sanded to impart a smooth finish to the metal. It is advisable to use a fine grade of emery paper so that there will be no deep scratches into the body metal.

Salaries of Engineers

St. Thomas, Canada—Editor MOTOR AGE—What is the salary of an expert mechanical engineer?

2—In attending university, how many years are required to reach a high degree in engineering?

3—How can I clean the oil out of the crank case of a 1912 Cadillac touring car without removing the crankcase?

4—How many miles to the gallon of gasoline can one get with the 1917 Cadillac eight?—J. R. Birch.

1—Anywhere from \$1,500 to \$25,000 a year and maybe more or maybe less.

2—At least 4 years.

3—Remove the drain plug on the bottom of the crankcase.

4—There have been no official tests concerning the gasoline consumption of this model.

DODGE MULTIPLE-DISK CLUTCH Explanation and Hints for Proper Adjustment and Care

Little Rock, Ark.—Editor MOTOR AGE—Give a description of the multiple-disk clutch used in the Dodge Bros. Car and tell me what things are necessary to do to care for it properly.—John McNutt.

The clutch consists of a series of driving and driven disks. The driving disks are covered on both sides with a wire-woven asbestos fabric riveted to them and the driven disks are plain. All the disks are free to slide on their respective supporting pins, and are held together by means of the heavy coil springs inside of the clutch hub.

To adjust or tighten the clutch spring it must be compressed sufficiently to allow the split washer which fits into one of the three grooves cut on the clutch shaft to be moved forward so that it fits into the next groove. After this has been done, care should be taken to see that the two halves of the split washer fit securely into the proper groove on the clutch shaft, and that the clutch spring retainers fit tightly around the split washer.

Keep the drain hole in the bottom of the clutch housing open, so that any oil may be readily drained out. The grease cup located on the toe board to the right of the accelerator pedal, which lubricates the ball-bearing clutch release, should be kept well filled and should be given one complete turn every 100 miles.

Make sure that the clutch release tubes are tightly connected and unobstructed.

READER WANTS AN OLD STEAMER Has Use for Second-Hand Equipment on His Farm

Eckford, Mich.—Editor MOTOR AGE—What is the address of Stanley steamer company?

2—Where can I get cuts and illustrations with description of the old White steamer engines and boilers?

3—Is there any company manufacturing and selling just the steamer engines and boilers?

4—In what ways have the Stanley cars been improved over the ones built 3 or 4 years ago?

5—How long has the Stanley company been

making steamers?

6—Do you know where one could purchase a second hand steamer engine?

7—What was the rated horsepower of the old White steamers, and what was the size of cylinders and speed of crankshaft?

8—Were the engines of the compound type?

9—Did they use a transmission and a clutch?

If so, where was it located?

10—Did they reverse the engine to back the car? I am thinking of getting one of these steamer engines for power purposes here on the farm.—Ira Hayes.

1—Stanley Motor Carriage Co., Newton, Mass.

2—Possibly from the White Co., Cleveland, Ohio.

3—Not to our knowledge.

4—See the article beginning on page 37 in the March 22 issue of MOTOR AGE.

5—Since 1897.

6—Not unless you could pick one up from the service stock of one of the steam car factories.

7—There were two sizes of steamers built each year. In the last year of its manufacture, 1912, there was a 20- and a 40-hp. engine. In previous years the engines were slightly different. Which model do you wish to know about?

8—Of the double-acting type, yes.

9—No.

10—Yes. It is a typical steam engine similar to those used in a locomotive.

READER REBUILDS MITCHELL CAR Built Body Out of 20-Gage Sheet Iron— Novel Windshield

George, Iowa—Editor MOTOR AGE—I have rebuilt a 1910 Mitchell as illustrated in Fig. 4. I made a false front on the radiator and placed a small bulb in the tip for a dimming light, and also the electric headlights. These are run from a storage battery which I hung underneath the body.

I built the entire body out of 20-gage sheet iron and upholstered the seats with Pantosote. There is a 35-gal. gasoline tank on the rear and a false tank of 8-in. diameter representing an oil tank, although used for a tool compartment.

Another novelty I have worked in is the windshield. This is made out of an old style shield, just cutting the glasses round and binding them with $\frac{1}{4}$ by $\frac{3}{8}$ -in. band iron and fastening them to the cowl.

Regarding rebuilding of the engine for more speed, I have changed the valve timing and also lightened the connecting rods and pistons by drilling holes, filing and turning them down in the lathe.

Upon completion of the mechanical work

I painted the car with a green body and white wheels and it certainly makes a very nifty speedster.—Homer Bodurn.

MEANING OF LAPPING IN RINGS Explanation of Common Method of Fitting Into Cylinders

Mayfield, Kan.—Editor MOTOR AGE—Explain the meaning of lapping a piston ring.

2—Also, where I can obtain an axle like the illustration of the dropped front axle on page 35 of the March 1 issue?—John Threlfall.

1—The process of lapping a piston ring involves grinding the ring to fit the cylinder by use of a suitable abrasive. The usual method of doing this is to place the new rings into an old piston which is a duplicate of the piston to be used in the car, although it may be done with the pistons to be used if the grinding is not done too long. The piston is equipped, through its wrist pin, either with a connecting rod or with a specially-made rod which may be grasped in the hand so that the piston may be moved up and down in the cylinder. The rings, piston and cylinder wall should be smeared with an abrasive paste. The emery within this paste should be very fine grade. Then, by moving the piston and its rings up and down within the cylinder, imparting an oscillating motion to the piston, the rings will be ground to a perfect fit all around against the cylinder wall. This grinding should not be continued too long, as with very little effort too much of the surface of the cylinder wall can be removed, making a sloppy fit of the piston.

2—MOTOR AGE knows of no one making an axle of this type. Those we have seen used are hand forged jobs made up from suitable alloy steel. Some of them have been made from axles used in other makes of cars.

Gasoline Saving

Minneapolis, Minn.—Editor MOTOR AGE—In your opinion would a Wilmo manifold installed on my Ross 8, Model C car save fuel? I understand it already has a water jacket. I am getting less than 8 miles to the gallon in warm weather, and at present only about $\frac{5}{8}$ to the gallon?

2—Would equal parts of gasoline and kerosene in any way injure the car, aside from harder starting?—E. Shumpik.

1—Yes.

2—No.

Gearing of Detroiters

San Antonio, Texas—Editor MOTOR AGE—I am thinking of buying a Detroit Six-45, five passenger 1917 model, and wish to be enlightened on gearing of this car. This car has a 7 W continental motor geared at 4.75 to 1, and the advertised weight of car is 2575 lbs. Could you tell me the advantage of gearing this car down so low, or is this 7 W continental motor a high speed job? It seems to me that a car weighing 2575 lbs. could be geared much higher and still be capable of climbing ordinary hills in high gear, considering the advertised power of 45 h.p.—O. B. Gallagher.

The engine is a high-speed type as are all new Continentals built for passenger car use. However, the car would probably stand a gearing of 4 to 1 and negotiate all ordinary roads.

Tracing Trouble By Sound

Minneapolis, Minn.—Editor MOTOR AGE—Inform me of the sort of a sound I will have to listen for to determine whether there is end play in the crankshaft or in the cam shaft? And when this is determined, what can be done

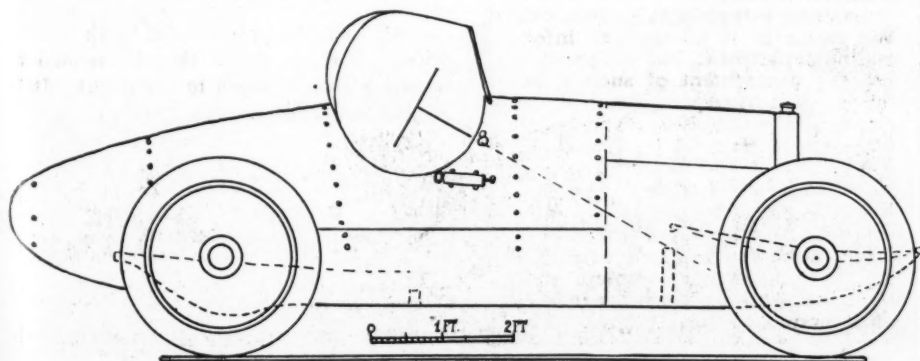


Fig. 3—Diagram showing how a Motor Age reader rebuilt a 1911 Regal

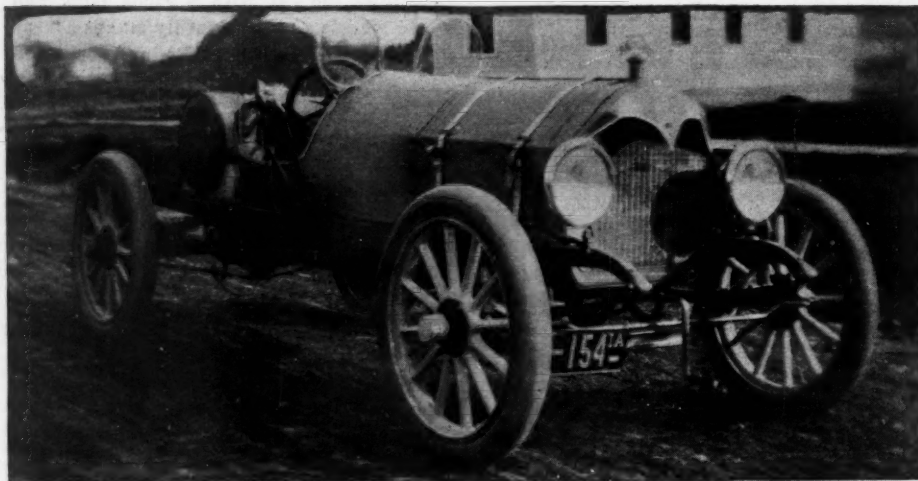


Fig. 4—Mitchell car of 1910 vintage built into up-to-date speedster. There is a bulb in the tip of the radiator tank

to take the end play up? This is with regard to a four-cylinder Buda engine.—C. H. W.

There is no accurate way of locating an internal engine trouble by the sound, unless a motor stethoscope is used. The best way to find the trouble is to tear down the engine, inasmuch as the engine should not be run anyway with loose bearings, and you will be obliged to disassemble it to take up this looseness.

Addresses of Aero Magazines

Simsbury, Conn.—Editor MOTOR AGE—If the pistons and the rings are a proper fit in the cylinder, is there any danger of the upper rings not getting enough oil when the lower edge of the bottom ring groove is beveled off, a number of small holes drilled in it, and the upper edge of the bottom ring rounded off?

2—What type of pump is best for force feed oiling?

3—Could a straight hole be drilled from a main bearing to a connecting rod bearing, in a Ford crankshaft?

4—Are there any monthly or weekly magazines published on aviation? Give name and address.—J. H. Humphrey.

1—No.

2—Both the gear pump and plunger pump are used extensively. It would be difficult to offer a preference for one or the other.

3—Not one hole. It would require three, two leading into the bearings and one down the cheek of the rod.

4—Yes. They are the *Aerial Age*, 116 West Thirty-second street, New York; *Aero World*, 47 Jefferson avenue, Brooklyn, N. Y.; *Aeronautics*, 122 East Twenty-fifth street, New York; *Aircraft*, 3739 East Twenty-eighth street, New York; *Flying*, Aeroclub of America, 297 Madison avenue, New York.

Cleaner for Radiators

Calamus, Iowa—Editor MOTOR AGE—Will you please publish in your next issue a cleaner for a radiator limed from using hard water, if there is such. If MOTOR AGE does not know of any, will you please publish a quest asking of others for information.—A Reader.

A simple solution to use when cleaning a radiator clogged with lime is a solution of soda and hot water. If soda will not remove the crust, one of the boiler compounds used for cleaning out steam boilers will do the work. There are several good

cleaners on the market especially designed for use in motor cars.

Why He Gets More Speed

Chicago, Ill.—Editor MOTOR AGE—I have recently changed the single magneto on my 1916 Stutz Bearcat for a two-spark outfit. I find a considerable increase in power has resulted, and that the car seems to have more elasticity and to have better pick up. Explain to me the reason of this? The type of magneto taken off was American made, and the type substituted was a D. R. A. from Stuttgart, Germany.—John C. Muirhead.

The reason is that a hotter spark was imparted to the explosive mixture. This hotter spark brings more complete combustion and thus more power with the same charge of gas.

Gears Are Noisy

Rome, Ga.—Publish a sketch of a Rayfield carburetor, model M, as used on a 1916 Paige 38. I desire a cross-section illustration showing the relation of the interior parts to one another.

2—State whether non-fluid oil or grease will quiet a noisy rear system when all other methods of adjustment fail to quiet same. If so, state the make of oil, or is castor oil better?—T. L. Morgan.

1—MOTOR AGE has no such illustration and is unable to obtain such from the factory. An adjustment illustration may be found in Fig. 6.

2—MOTOR AGE never recommends particular makes of oil. We would suggest that you try a fibrous grease, the more spongy the better. Mix a good quantity

of graphite with this. If this fails, as a last resort you might pour in a cupful of ground cork.

Horsepower of Hupmobile 20

Youngstown, Ohio—Editor MOTOR AGE—What is the maximum r.p.m. speed of the engine used in the Hupp 20?

2—What horsepower will this engine develop on a dynamometer?

3—What percent of increase in the dynamometer horsepower will one secure from using aluminum pistons and connecting rods in the engine?

4—Having cylinders reground over-size in this engine would give what percent increase of horsepower?

5—Would the replacement of the regular factory carburetor and manifold with one of the present date improve the hill climbing of this car?

6—What are the names and addresses of the manufacturers of steam motor cars?—Miles Gibson.

1—There is no record of its performance as it was manufactured before the day of high speed dynamometers.

2—Approximately 16 hp. at 1600 r.p.m.

3—There is no possible means of estimating. A poor job of fitting might even reduce the power.

4—It depends on the amount of oversize, the compression of the reconstructed job and many other considerations which make an estimate impossible.

5—Yes.

6—Stanley Motor Carriage Co., Newton, Mass., General Engineering Co., Detroit, Mich.

Mercer Builds Its Engine

Barberton, Ohio.—Editor MOTOR AGE—What is the address of the firm that makes the Fletcher carburetor?

2—Did the Mercer Auto Co. of Trenton, N. J., build their own engines in 1913-14? If not, who did build them?

3—Can you give a valve timing for the above type 35 engine that would be suitable for racing? Also please give valve timing for the same engine as it was designed for all around work.—Frank J. Potts.

1—L. V. Fletcher & Co., 245 W. 55th St., New York.

2—Manufactured their own engines in 1913-1914.

3—Intake valve opens $1\frac{1}{2}$ in. after top center. Intake valve closes 9 in. after next bottom center. Exhaust valve opens 10% in. before bottom center. Exhaust valve closes $\frac{1}{2}$ in. after next top center. Magneto setting as follows: $\frac{1}{2}$ in. opening in armature gap when on dead center.

The valve timing for racing is the same

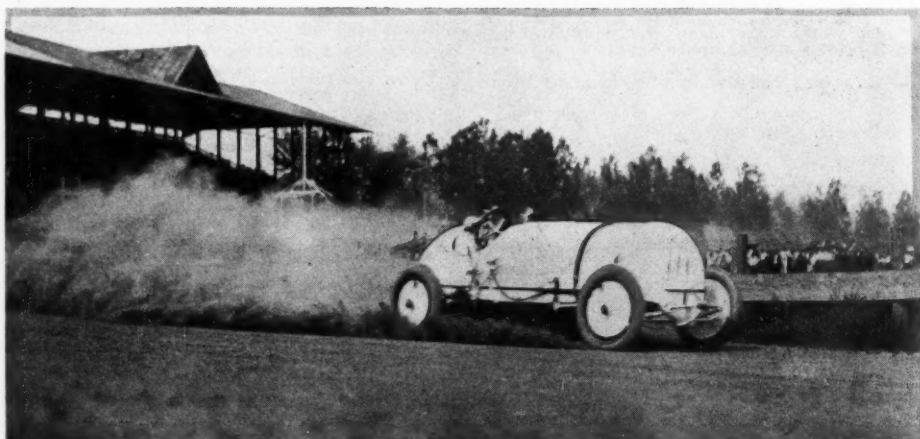


Fig. 5—Disbrow driving the Jay Eye See racing car

as above except that the opening in the armature gap should be $\frac{5}{8}$ of an inch instead of $\frac{1}{2}$ of an inch.

The Counterbalance Feature

Emporium, Pa.—Editor MOTOR AGE—In your issue of March 15 you describe the new Cameron Six as having a carefully counterbalanced crankshaft? It was my understanding that the counterbalanced crankshaft is a patented feature of the Hudson Super Six engine. Will you set me right in this and explain just what the basic patent of the Super Six is?—Kay Rehberg.

The patent on the Super-Six crankshaft covers the method by which the crankshaft is balanced. It does not cover the principle of counterbalancing. Counterbalancing of reciprocating machinery is nothing new. Look at the driving wheels of any railway locomotive. You will find counterbalances cast into the wheel on the side of the wheel opposite the connecting rod or piston rod bearing.

Aluminum Pistons in Dodge

Los Angeles, Cal.—Editor MOTOR AGE—Can MOTOR AGE give any definite information regarding the result of installing aluminum pistons in a Dodge touring car?

2—If this was done, and a gear ratio of about 4 to 1 installed, would it increase the pulling power on high gear?

3—How much would the speed be lowered?

4—Would it be feasible to try to counterbalance the crankshaft in this car by welding on the counterweights?—George H. Pannell.

1—If properly installed power would be increased and vibration reduced.

2—Yes.

3—The speed would not be lowered. If the alteration is done properly the speed should be increased.

4—No.

Can't Counterbalance Crankshaft

Mt. Vernon, Ohio—Editor MOTOR AGE—Publish a wiring diagram for my Saxon four roadster with electric lights and starter; also connection to ammeter, making it a one-wire system instead of two.

2—Is there room for counterbalancing the crankshaft?

3—Would the drilling of holes in the connecting rods to lighten them weaken them to any great extent?

4—What, in your opinion, is the most effective racing carburetor on the market?

5—Would spark intensifiers aid in speed?

6—What would be the highest gear ratio you could use in such a car for a road race?—V. N. Clymer.

1—If you have electric lights and starter on now, what make is the equipment? If you have none what make would you intend to use? Your question gives us no information.

2—No.

3—This is usually a dangerous alteration

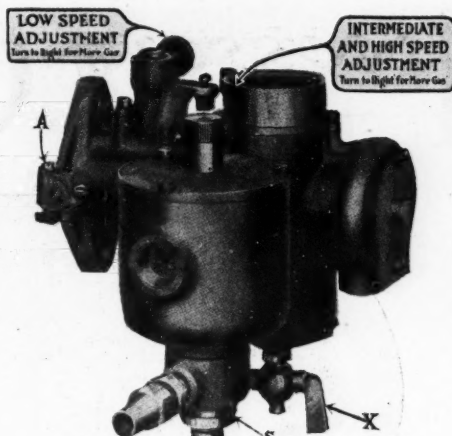


Fig. 6—View of model M Rayfield carburetor, showing method of adjustment

to make, although many have done it successfully. The connecting rod is as light now as the factory considers advisable, leaving a sufficient margin of safety. We do not recommend the change.

4—MOTOR AGE does not express preferences of this nature.

5—Possibly to some extent.

6—About $3\frac{3}{4}$ to 1.

Mitchell Wiring System

Chicago—Editor MOTOR AGE—Publish a diagram of the electric starting and lighting system of the 1913 Mitchell Model 5-4.

2—Where could a new cutout be obtained suitable for this system?

3—Is there any possible way of wiring this system without the cutout?—R. J. Weber.

1—Shown in Fig. 1.

2—Probably from Mitchell.

3—No. A cut-out is essential to the proper operation of the system.

Wants Faster Ford

Industry, Ill.—Editor MOTOR AGE—I have a Ford and it does not have speed. What can I do to make the engine turn over faster? It has power at low speed.—Walter Burnham.

Your information is so far from comprehensive that we are really at a loss to know what you want. The Ford car, in its stock equipment, is not capable of high speed. Under ordinary conditions 40 m.p.h. is all that one can expect. If you desire to speed the engine up you can do so, if the work is done properly, by installing aluminum pistons and non-leaking rings. Setting the ignition ahead and installing a

high-speed camshaft is another step for higher engine speed. If you desire to increase the speed of the car without altering the engine you can install higher gears. This, however, will impair the pulling power of the car at low speeds and minimize its flexibility.

Two-Plug Ignition

By way of additional data on the use of two-plug ignition as asked for by "A. Subscriber, Trenton, Mo.," the Superior Motor Power Co., 30 Irving Place, New York, manufacturers Su-Dig double-terminal plugs writes in part as follows:

"Permit us to advise that the system of two-plug ignition (more than one plug firing simultaneously in each cylinder) will increase the power of any motor, whether a T-head, L-head, or I-head. Perfect combustion (which is the quick and complete burning of the fuel) will improve the efficiency of any motor, but naturally the increase in power would be more noticeable in a motor with large cylinders, such as a T-head, than in a motor with smaller cylinders, such as an L-head.

"You say that the sparks are not dependable; this might be the case with a poor ignition equipment, but with a good magneto or strong battery the spark is more dependable than with a single plug, for the simple reason that if one of the spark points should become carbonized and fail to fire, the other one will continue firing, thereby practically eliminating missing of the motor and eventually burning clean the other plug.

"We can show you letters of recommendation from users of our Su-Dig two-plug system with almost every car manufactured that can conveniently take two plugs per cylinder, and in every case the users are more than satisfied from the results obtained."—Superior Motor Power Company.

Ball and Roller Bearings

Fairfield, Mont.—Editor MOTOR AGE—Are the present car manufacturers going back to ball bearings rather than rollers?—D. H. Jones.

There does not seem to be a sweeping tendency in this direction. The comparative use of ball and roller types seems to maintain an equilibrium.

Jay Eye See Illustrated

Kewanee, Ill.—Editor MOTOR AGE—Publish a picture of the 290 hp. Jay Eye See Case car, driven by Louis Disbrow.—Ernest Spiegel.

The best view we have in our files is shown in Fig. 5, and, unfortunately, this is not a very good one.

Reliners for Old Tires

Bailey, S. D.—Editor MOTOR AGE—Please let me know what you think about the reliner to put inside the casings of motor car tires. Are they all right and do they prolong the life of the casing?

2—What kind are best?—James Garman.

1—Reliners are very useful in prolonging the life of tire casings that have become so worn that the shoe is unsafe.

2—MOTOR AGE cannot recommend particular kinds of products.

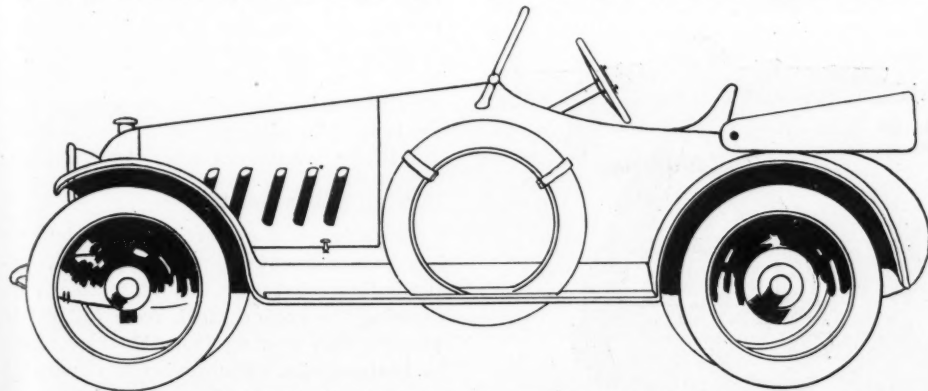
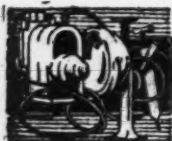


Fig. 7—Joseph Morris of Los Angeles, Cal., says that motor car makers would find big sale for a car something like the above selling in the neighborhood of \$666. He thinks that the light-weight, low-priced racing type has been overlooked.



The Accessory Corner



Watson Ventilator for Fords

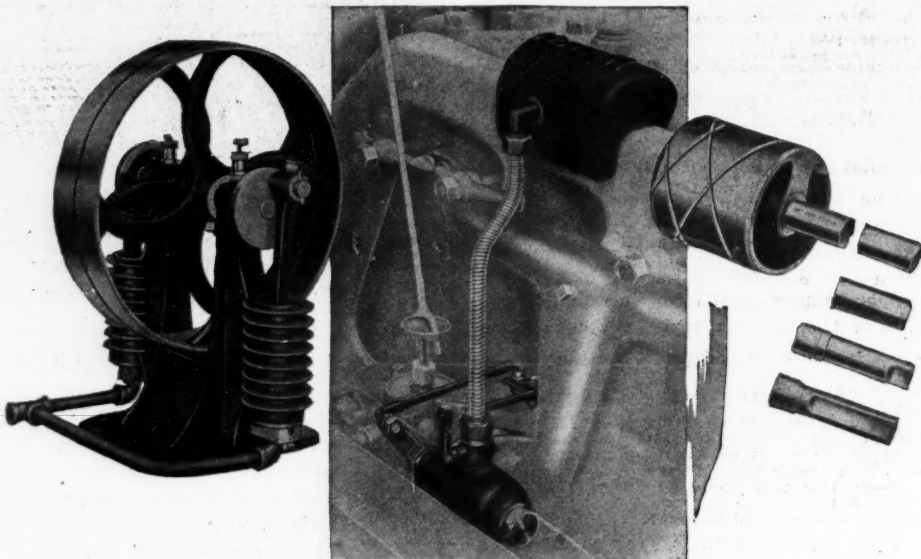
THE Watson ventilating windshield panel is designed to replace the lower glass in Ford windshields. About half of the section retains its glass panel and the lower half embodies a ventilating door which may be opened or closed easily by the driver. The air is directed in a down draft into the floor space of the front compartment, keeping it cool in hot weather. The price is \$5. Glass-Evans Auto Co., Grand Island, Neb.

Electric Door Opener

The Electromatic is an electrically-operated door opening and closing hardware with a check-locking device and light connection. To operate it is only necessary to press a button and the city light circuit will do the work. It is claimed that the opening and closing takes but 4 sec. Two push buttons are placed wherever desired. Pressing the opening button turns on the lights, unlocks the doors and folds them back. Pressing the opening button the second time stops the doors instantly. Pressing the closing button reverses the operation. Buttons, when placed outside the building, may be operated with a cylinder lock. In case of emergency, should the power be off, etc., a pull of a lever disengages the gears and the doors may be hand-operated. These doors are mechanically connected one to another, so that opening or closing one opens or closes the other. If there is any obstruction between the doors when they are closing there is a spring-checking device to prevent damage. The mechanism is motor-driven through worm gears and everything is substantially designed. Prices upon application. Allith-Prouty Co., Danville, Ill.

Beckley-Ralston Offerings

The Trojan air compressor No. 1 is a substantially built two-cylinder stationary machine which sells for \$17.50. The bearings are unusually large and wide. The cylinder is bored and reamed. Pistons have two cast-iron split rims fitted with great care. The cylinder head and valve chest are of one piece, allowing large valves. The intake-valve stems project through a hole in the valve plate, allowing inspection or removal without disconnecting the discharge pipe. Valve plates screw into the cylinders and are made airtight without packing by a construction similar to a poppet valve. The bore is 1½ and the stroke 2 in. The Trojan cylinder lap is for grinding engine cylinders for over-size pistons. The lap is made similar to a piston ring. The slot shown in the illustration is milled in the rough casting. The casting is then compressed in a jig and the outer surface turned to the actual cylinder size, giving the shell a stiff spring and



The Trojan air compressor on the left and the Trojan cylinder lap on the right. In the center is the Hoosier sub-carburetor

causing it to form a contact throughout its entire surface on the cylinder wall. Transverse grooves are cut in the lap for retaining the abrasive, which should be a very fine grade of valve-grinding compound. To use, one covers the surface with grinding compound, placed the shank in the drill press and operates at low speed. By using the hand feed of the press the lap is moved up and down rapidly within the cylinder. About 5 min. is required to remove .001 in. from the cylinder wall. The complete price with one head and shank for sizes from 3¼ to 3⅞ in. is \$6. The spindle bushing remover for Fords

is a convenient tool for garage use. The spindle body bushings of the Ford car are driven into the cylindrical hole of the cylinder body which is about 4¾ in. long. One is set in each end and the flange on the bushing is brought flush with the spindle body. This makes it difficult to remove worn bushings. This spindle bushing remover has a knurled end which is inserted through either bushing and pulled through until the expanders slip over the inside edge of the bushing. Then by tapping on the knurled end of the tool with a hammer, the bushing is removed easily. Price, 80 cents. All three articles are marketed by the Beckley-Ralston Co., Chicago.



Above is a spindle bushing remover for Fords; below the Continental universal engine stand

Detroit Hub Caps for Fords

The Detroit hub cap for Ford cars is designed to give a more substantial appearance to the Ford wheel and to cover the unsightly, rusty appearance often noticed on the metal flange and bolts at the hub. It is said that application of the Detroit hub cap also lowers the high appearance of the running board. They are made from a selected grade of 20-gage steel and finished in nickel on a heavy copper base. The price per set of four is \$3.75. The Harry Svensgaard Sales Corp., Detroit.

Hoosier Sub-Carburetor

The price of the Hoosier sub-carburetor has been reduced from \$10 to \$7.85, and the builders have recently reorganized, increasing the capital stock from \$10,000 to \$25,000, also moving from Dunkirk, Ind., to Indianapolis. The device is illustrated on these pages. After the mixture of air and gasoline leaves the carburetor it is drawn through a copper cloth or screen

which is attached to the screen block of the sub-carbureter. This breaks the mixture to a finer form and naturally has to have more air. The air is drawn from the exhaust, being heated, to the sub-carbureter valve which regulates it to the proper amount for all speeds of the engine, so it is claimed. Its function is to cause a larger per cent of the gasoline that is taken into the engine to be exploded and thus to save fuel. Hoosier Sub-Carbureter Co., Dunkirk, Ind.

Simplex Precision Governors

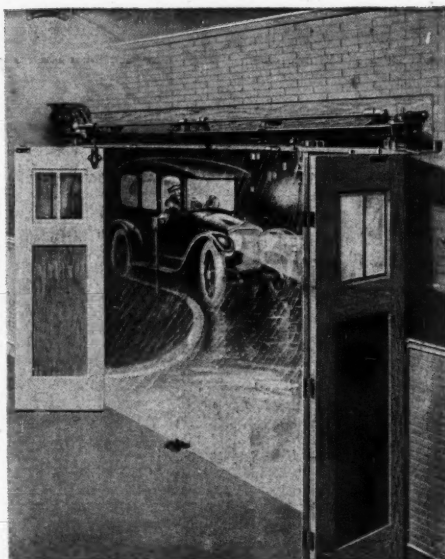
The makers of the Simplex governor have developed a line of constant speed instruments for engines ranging in size from 150 cu. in. to 100 cu. in. of piston displacement. It is based on the Duplex design which has been in use for some time. Simplex is a single-drive governor operated from the engine. It operates on the fuel mixture delivered to the engine, and it is claimed that the torque will be increased 5 per cent by the governor because of a better mixing and feeding of the fuel. The governing feature lies in the Simplex valve which is of short travel and quick action, giving full throttle almost to the point of the set cutoff. The Duplex Engine-Governor Co., Inc., Brooklyn, N. Y.

Red Cross First-Aid Box

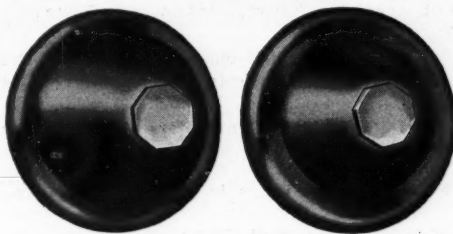
An American red cross first-aid box is a useful adjunct to the equipment of motor car tourists. The boxes may be obtained in various amount of equipment in prices ranging from \$2.50 to \$7. Should the unlooked for accident come, away from prompt medical aid there is everything right at hand in the compact box to take care of the injuries permanently, or at least temporarily until medical assistance can be reached. The outfit shown costs \$4.50. Bureau of Supplies, American Red Cross, Washington, D. C.

Continental Engine Stand

The Continental engine stand handles all kinds of engines, fours, sixes, eights, twelves, either separate engines or unit powerplants, with equal facility. It is easily and quickly adjustable to any type, and being provided with casters is easily moved from place to place. Because of its simple construction there is practically no obstructions to hinder the operator. It



The electromechanical door opener which opens and closes the door by electricity



Detroit hub caps for use on Fords. They are more substantial appearing than the regular caps

handles engines of three- or four-point suspension with any pan construction. The support can be turned over completely or turned to any angle and solidly locked in any position. The price is \$30. Continental Auto Parts Co., Knightstown, Ind.

Dry Battery Spot Light

A powerful spot light that gets current from ordinary dry-cell batteries is now manufactured by the Pittsburgh Electric Specialties Co., Pittsburgh, Pa. Since most motor boats and motor trucks and tractors and many of the smaller passenger cars are not provided with an electrical system, there is a field for this new device. The feature of the lamp is a powerful focusing lens used in conjunction with an 8-in. parabolic reflector. This produces a strong beam of light with extended thrust for the low current consumption of one emperer,

thus making dry cells an economical source of current supply. The lamp is also suitable for a 6- or 7-volt light system. The price is \$5 with bracket and \$6 with deck stand.

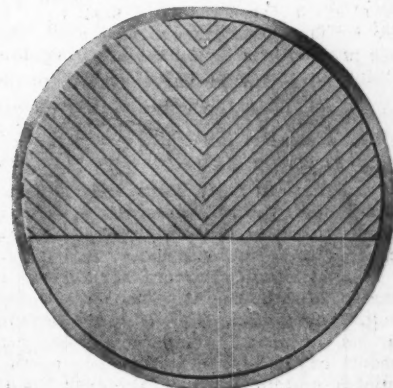
Totalux Headlight Front

The Totalux headlight glass is made of diagonal prisms. It deflects the upward rays of light and distributes the light over the full width of the road. Thus all of the light is utilized and the glare is killed. It is claimed that all black shadows are eliminated and that the road is lighted from ditch to ditch without diffusion of the full effect of the light, at the same time keeping this light concentrated so that it cannot glare into the eyes of people ahead. The Consolidated Sales Corp., Milwaukee, Wis.

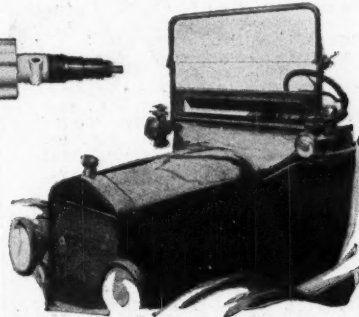
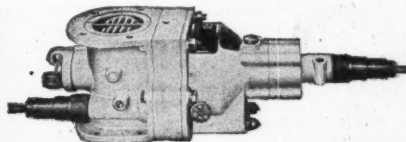


LOZIER PARTS

Detroit, Mich.—Editor MOTOR AGE—There appear to have sprung up some companies who are making an illegitimate attempt to supply some Lozier owners parts under the guise of their being of the original specifications. We have investigated this and have found that the parts supplied are not of the alloy steels shown on the company's blue prints and specifications but are entirely foreign to the same and will wear so quickly as to make it prohibitive for the customer to purchase them at any price. Some investigations disclosed that the parts have been disassembled from some old cars, polished up and supplied under the guise of being new. So that our customers may not be misled by such representations we are making every effort to acquaint them with these facts and to caution them to beware of these so-called part suppliers of fraudulent repairs who claim they are in possession of a complete stock of all parts for all Lozier cars.—Lozier Motor Co.



The Totalux concentrates the light to eliminate glare without losing any of the light



Red Cross first-aid box, Simplex engine governor and Watson ventilator for Fords

From the Four Winds



RED CROSS Gets Gift Car—The Imperial Order of Daughters of the Empire, Canada, has purchased an eight-cylinder King chassis and presented it to the Red Cross after a special ambulance was mounted on it.

Omaha Prepares for Motorists—Omaha, Neb., will have camp sites in at least two of the city parks to accommodate overland camping motorists this year. The Omaha Automobile Club is working with the park commission on the project. Picnic grounds will be located outside the city at distances of 20 and 30 miles. They will have outside camp grates, benches and tables for motorists who like to run out into the country for a lunch and rest.

Forewarned Is Forearmed?—Motorists are warned that they must hide the bottles in the brush, marking them carefully with three large stones, as they cross the state line into Kansas. Nobody can carry any intoxicant into the state—without suffering penalty if discovered. In many districts the local officers are quite as keen after the violators of this law as they have been after the motorists whose license numbers were not quite up to date or whose speed did not comply with local regulations.

Worst Roads in Years—The last winter has been the hardest on roads that New Jersey has seen for about twenty-five years. Frost was from 2 to 4 ft. deep, and the recent thaw made many roads almost bottomless morasses. The motor stage running between Bridgeton, Conn., and Salem, Mass., was stopped ten days, the first time lost since its start over three years ago. Hundreds of machines have been stuck, some remaining in the mud for a fortnight. The sun and wind are rapidly drying out all roads now, however, and they soon will resume a normal condition.

New Road Ready for Travel—Frank W. Buffum, Missouri state highway commissioner, announces the readiness of a new trans-Missouri highway. This road has been known as the Southern highway and leaves St. Louis through Clayton, runs along the southern bank of the Missouri river through Union, Washington, New Haven, Hermann, Chamolis, Linn and Westphalia, crossing the Missouri at Jefferson City, thence north to Columbia and to Kansas City over the Old Trails road. Active construction on this highway has been pushed through the winter, the need being considered urgent after the burning of the Missouri bridge at St.

Charles, Mo., which closed the National Old Trails road, the favorite driveway to Kansas City.

Army Recruits Roadbuilders—The engineer reserve corps of the United States army is recruiting men with a knowledge of road-building. The corps is being organized as a reserve body of specialists in every branch of construction work. The officers are engineers of distinction. Road foremen are eli-

THAWING BY MACHINERY—Electric thawing machine used by the Spokane water department. The truck was built by the Spokane fire department and includes a Hershell-Spillman four-cylinder, 48-hp. engine, Bosch magneto and Master carburetor. The thawing machine which is mounted on the truck bed consists of a four-cylinder, 40-hp. Continental engine equipped with a Schebler carburetor and Bosch magneto. This engine drives a 300-amp., 60-volt generator. The electricity is conveyed to the water pipes by a 1/2-in. flexible wire cable, rubber coated. This machine has given the very best of satisfaction for the last two years, doing away with the old-style steam thawing and dependence upon the electric company's lines, which are at times inaccessible.

gible to several grades above that of sergeant. Enlisted men must serve an annual training period of fifteen days, and there are 109 in a pioneer company.

Three Cities Form Association—The Moline, East Moline and Silvis, Ill., Automobile Association has been organized with these officers: President, L. F. Haemer; vice-president, W. E. McClain; secretary, G. C. Hepburn; treasurer, A. J. Oslund.

Red Bank, N. J. Show—The Monmouth County Automobile Dealers' Association held its second annual show in the Red Bank armory, March 13-17. Nineteen dealers exhibited about seventy-five passenger cars, representing thirty-one makes. There were eighteen accessory displays.

Gets Roadster from Diving—Walter McCray, well-known diver of Tacoma, Wash., has followed a unique manner to get funds to purchase a Buick car. He has been diving for copper near the Tacoma Smelter docks, which had been lost overboard from loading ships, and recovered such large quantities for the company that he now has sufficient funds to purchase a roadster.

Dim Headlights; Light Streets—The Columbus Automobile Club, through a letter to Service Director Borden, has taken up the matter of better street lighting for Columbus, Ohio. The club suggests that if the ordinance prohibiting glaring lights on cars is enforced strictly, for the protection of pedestrians as well as motorists better street lighting should be provided.

Northern Michigan to Exhibit Cars—The Upper Peninsula of Michigan's first real motor show will be held April 11-14 at Calumet, Mich., under the management of the Upper Peninsula Show Association, of which Harry E. King is secretary and manager. Heretofore shows have been held in various cities of northern Michigan each spring, but this will be the first co-operative show.

Employees Collect Safety-First Hints—Department heads and employees of the Falls Motors Co., Sheboygan Falls, Wis., have organized an Efficiency Club, which meets monthly at dinner. The list of accidents in the plant during the preceding month is read, and everyone is invited to make suggestions as to how similar accidents may be prevented in the future. Each member also is requested to submit a list of safety-first suggestions from his or her particular and intimate viewpoint of employ-

Coming Motor Events

CONTESTS

—1917—

May	10—Uniontown, Pa., speedway.
May	19—New York, speedway.
May	30—Walla Walla, Wash., track.
May	30—Uniontown, Pa., speedway.
June	9—Chicago, speedway.
June	16—Kansas City, Mo., speedway.
June	23—Cincinnati, Ohio, speedway.
July	4—Visalia, Cal., road race.
July	4—Spokane, Wash., track.
July	4—Benton Harbor, Mich., track.
July	4—Uniontown, Pa., speedway.
July	4—Tacoma, Wash., speedway.
July	4—Omaha, Neb., speedway.
July	15—Missoula, Mont., track.
July 17-19	—Intercity Reliability.
July	22—Anaconda, Mont., track.
July	29—Great Falls, Mont., track.
Aug.	4—Kansas City, Mo., speedway.
Aug.	5—Billings, Mont., track.
*Sept.	3—Cincinnati, Ohio, speedway.
Sept.	6—Red Bank, N. J., track.
Sept.	8—Pike's Peak, Colo., hill climb.
*Sept.	15—Providence, R. I., speedway.
Sept.	22—Allentown, Pa., track.
Sept.	28—Trenton, N. J., track.
*Sept.	29—New York, speedway.
Sept.	30—Uniontown, Pa., speedway.
Oct.	6—Kansas City, Mo., speedway.
Oct.	6—Uniontown, Pa., speedway.
Oct.	6—Danbury, Conn., track.
*Oct.	13—Chicago, speedway.
Oct.	13—Richmond, Va., track.
Oct.	27—New York, speedway.

* A. A. A. Championship Award Event.

SHOWS

March 27-31	—Clinton, Iowa.
March 27-31	—Deadwood, S. D.
April 2-7	—Providence, R. I.
April 4-7	—Stockton, Cal.
April 11-14	—Calumet, Mich.
April 20-26	—Milwaukee, Wis.

ment, not only to promote industrial safety but to increase the efficiency of the plant in general.

Wausau, Wis., Plans Another Show—The Wausau, Wis., Automobile Dealers' Association, which conducted a successful show on Feb. 21-24, with the co-operation of the Milwaukee Automobile Dealers' Association, is planning to hold a mid-summer show. Dates have not been selected nor definite arrangements made.

Canada-Texas Highway Surveyed—Surveying of the King of Trails Highway, the new military road from Winnipeg, Man., to San Antonio and Galveston, Tex., has been completed. Austin is on the road to San Antonio and D. E. Colp of that place is inspecting the road from San Antonio to Denison. This is practically all the Texas stretch of the road.

Scorekeeping with Car—In California push ball is a popular diversion, and it takes a speedy man to act as scorekeeper. In a recent game between different classes from the Los Angeles Y. M. C. A. an Inter-State proved a vantage point for scorekeeping, as the car could move quickly enough to bring every angle of the play into the line of vision.

Tire Repairing School Graduates Hundreds—The first year of the Goodyear Tire & Rubber Co.'s school of tire repairing has just ended and hundreds of men have qualified themselves as tire repairmen. The school has grown rapidly and now has a waiting list. In the last class to finish men from eleven states were enrolled. One man was from Cuba.

Jitneys Hurt Street Railways—For the second year since the operation of jitney buses began at Dallas, Tex., the street railways there have operated at a loss, according to the reports filed with the county clerk. The total loss by the three companies is \$235,719.96. Without the jitney buses these street railways have operated at a profit of more than \$200,000.

Denver to Have Fall Show—A fall motor show for Denver this year has been decided on definitely by the Automobile Trade Association of Colorado as a result of a canvass. Fall is favored by many members of the trade body and the committee believes that the show conducted this spring as a private enterprise will serve to stimulate interest in a fall exhibit for new models.

El Paso Salesmen Unite—The motor salesmen of El Paso, Tex., including those who cover that part of the southwestern territory, have organized the El Paso Motor Trades Association. The officers are: Lee Davis, Tri-State Motor Co., president; L. M. Cregor, Southern Motor Co., vice-president; R. W. Deason, Payne-Rakestraw Co., secretary; Charles Thomas, Lone Star Motor Co., treasurer.

All Canadian Clubs to Meet—The annual meeting of the Canadian Automobile Association, which is an organization embracing all motor car clubs of the Dominion, will be held at Ottawa, April 12. As this will be during the fourth Canadian and International Good Roads Convention, a representative attendance is expected. Important questions affecting the future of the clubs and their attitude in regard to legislation will be discussed.

How's This for Annual Mileage?—J. A. Van Horn, Los Angeles, Cal., has been engaged in the transportation of newspapers from Los Angeles to Santa Barbara thirteen months and has covered 94,000 miles during that time. Mr. Van Horn uses a Chandler, carrying a ½-ton load on week days and about ¾-ton on Sundays. If passengers wish to make the trip, a trailer is used for the newspapers. The car is equipped with oversize Goodyear cord tires which have been giving 12,000 miles to the

set, Mr. Van Horn reports. In the 94,000 mileage 6000 gal. of gasoline, costing more than \$1,200, have been used.

Idaho Gets Road Funds—The house of representatives at Boise, Idaho, has passed a bill approving the \$1,000,000 bond issue providing for the building of good roads in that state. The act will make available for road construction in Idaho during the next two years a grand total of \$2,750,000.

Holds Closed Car Show—The Dallas, Tex., closed car show was held March 5. Some of the models shown in the New York and Chicago shows were exhibited. This was the first closed car show Dallas has ever had. It was held with the spring style show and is to be an annual event.

Pave Part of Pacific Highway—Jackson county, Oregon, has the distinction of being the first county in Oregon to do any paving on the Pacific highway. A distance of 18 miles has been completed in the vicinity of Medford. The grades are practically level and the turns are few and far between.

Wisconsin Dealers Organize—The Iowa County Automobile Dealers' Association was organized with a membership of sixteen dealers at a meeting held in Dodgeville, Wis. Officers were elected as follows: President, J. H. Ford, Dodgeville; Vice-president, Dodgeville; secretary, Harold Cummings, Mineral Point; treasurer, C. C. Dixon, Rewey, Wis.

Texas Would Aid Motorists—The commissioners' court of Dallas County, Texas, this week ordered sign posts placed at every road intersection in the county. The work will cost nearly \$1,000. An effort is being made to have the counties in Texas traversed by the leading highways to the Gulf place these signs for the convenience of motorists who visit Texas.

Golf for Southern Tourists—The Commercial Association at Thomasville, Ga., is planning a new eighteen-hole golf course and polo grounds for tourists. A golf course, polo grounds and 150-room hotel are part of the plan, which also includes a winter cottage idea whereby small plats near the club grounds would be sold to those wishing to erect winter cottages. The project is to cost \$350,000.

Oregon Dealers Get Appraiser—The members of the Dealers' Motor Car Association of Oregon have established an official appraisal authority for all second-hand cars offered by owners toward the purchase of new cars. The organization comprises nearly every retail dealer in the Portland territory, who have agreed to abide by an appraisal as the maximum value that can be placed on an old car. For each appraisal a charge of \$1 will be made, except in the

cases of Ford cars offered in trade toward a new Ford, which are exempt from the agreement.

To Make Road Materials Uniform—Representatives of twenty-one states met recently at Washington, D. C., in conference with the staff of L. W. Page, director of the United States office of public roads, to bring around greater uniformity in the requirements for the materials used in road building and maintenance.

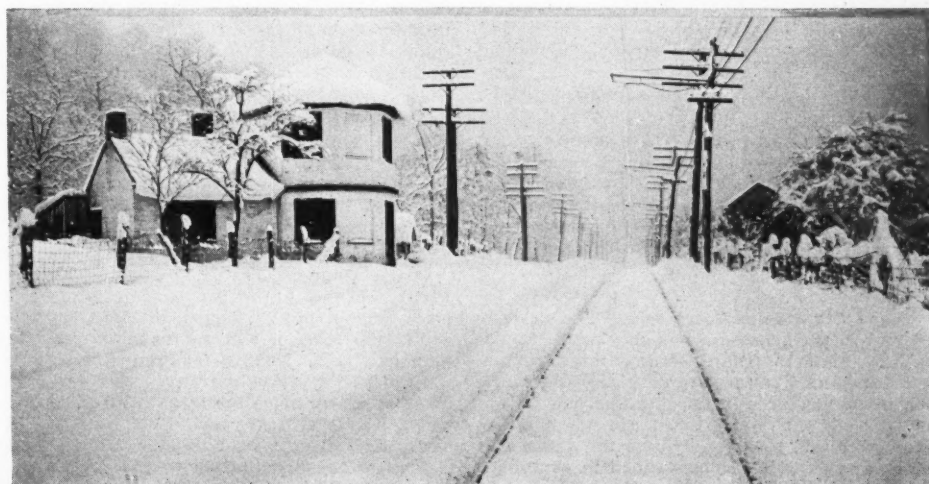
Nashville Ford Dealers Unite—The Nashville, Tenn., Ford Dealers' Association has been organized with the following officers: Z. D. Dunlap, president; Charles H. Simpson, vice-chairman; Walter McAdams, secretary and treasurer. Plans are made for two meetings each month and the attaches of the agencies are to be included in the activities.

Co-Operative Garage Formed—The Co-Operative Garage Co. has been organized at Dallas, Tex., and plans have been made for a building to cost \$60,000. The garage is to be conducted on the co-operative scale. Every patron must be a stockholder and a member of the company. The cost of maintenance is to be pro-rated among the stockholders.

Makes Cross-Country Delivery—Two Willys-Overland delivery cars have returned to Toledo from a rigorous mid-winter transcontinental tour to San Francisco, where the cars delivered spark plugs carried across the continent for the Champion Spark Plug Co. of Toledo. The cars made the trip in slightly more than thirty days and carried a large assortment of advertising material for spark plugs for the dealers at the San Francisco show.

Police Sergeant Asks Dealers' Aid—At the monthly meeting of the St. Louis Motor Accessory Trade Association last week, Police Sergeant Gerk, in charge of the traffic squad, spoke on the chief obstacles in enforcement of traffic laws and asked aid in educating motor car drivers to obey the law in these particulars. He advocated the examination and licensing of motor car drivers. He also asked the dealers to support a movement for an ordinance to prohibit jay walking.

How Cars Are Packed for Export—For export shipment a car must be packed in a box lined with waterproof paper and so solid that it can be dropped without injury to the contents. The admiralty laws require drainage of all acid from the batteries to prevent possibility of the acid causing fire or eating holes in the ship. Shipments to Java, from St. Louis, Mo., made from the Moon Motor Car Co., requires three months. The concern is holding exports for Spain, Sweden and Norway to find ships to carry them.



ON THE NATIONAL ROAD IN WINTER—Toll house on National road near Cumberland, Md., in winter. The toll house is very old but is in excellent condition



Among the Makers and Dealers



PROGRESS OF HARROUN FACTORY—The assembly building of the Harroun Motors Corp. is entirely inclosed now. The photograph shows Ray Harroun driving a Harroun car in the assembly building

DELL Buys for Detroit—J. L. Dell has been appointed purchasing agent for the Detroit Motor Car Co. to succeed R. B. Herrick.

Remy to Enter Traction Field—Frank Remy, former head of the Remy Electric Co., Anderson, Ind., and Detroit, is about to re-enter the industry as the manufacturer of a tractor.

New Magneto Company Formed—The Nissinger Magneto Co. has been incorporated at Cleveland, Ohio, for \$15,000. Incorporators include R. H. Lee, W. J. Patterson, F. H. Crew, G. M. Gallagher and F. Caldwell.

Amos Resigns from Studebaker—Frank B. Amos, assistant sales manager and advertising manager for the foreign division of the Studebaker Corp. of America, has resigned to join the forces of the American Exporter of New York.

Kelsey Earns 6.46 Per Cent—The Kelsey Wheel Co. in its first annual report for the year ended Dec. 31, shows gross sales of \$6,176,921, and net profits of \$856,639, which is equivalent to 6.46 per cent on the \$10,000,000 of common stock. Assets are \$14,906,674.

Will Build 210 Houses—The Coventry Land Co., subsidiary to the Firestone Tire & Rubber Co., is building 210 new homes in Firestone park, where Firestone employees can purchase homes at cost on time payments, and has taken out permits for the construction of 500 more, to cost in all nearly \$2,000,000.

Piano Store Sells Accessories—The newest recruit in the accessory business in St. Louis is the Field-Lippman Piano Stores. This concern is one of the largest piano and talking machine stores in the city and one of the oldest. One side of the large main floor storeroom will be given over to the accessory stock and exhibit. It is planned to establish a tire service very soon. The firm also operates branches in several Missouri and

Texas cities, and the accessory business will be extended to them if it proves successful in St. Louis. W. A. Lippman is secretary.

Oberling Purchasing Agent for Denby—R. S. Oberling has been appointed purchasing agent for the Denby Motor Car Co. to succeed K. A. Morrison.

Wood Manages U. S. Tire Branch—G. H. Wood has been appointed manager of the Toledo branch of the United States Tire Co., succeeding C. Q. Vaughn, who will take charge of the Lima, Ohio branch.

Shaw Joins Harroun—Frank Shaw has been appointed traffic manager of the Harroun Motors Corp. Mr. Shaw was formerly the foreign traffic manager and special sales representative of the Studebaker Corp. of America.

Lee Schedule is Doubled—The Lee Tire & Rubber Co. has increased its output since the first of the year. The January output was 18,000 tires, February 26,000, and March production is at the rate of 30,000. The current manufacturing schedule is twice the average monthly production of last year.

Adds Consulting Engineer—The advertising department of the Chalmers Motor Car Co. has added a consulting engineer to its staff to check up and verify technical statements in advertising copy. C. L. Nedoma, who was formerly with the Laurin-Klement Co. of Austria, has been appointed to the position.

Dealer Engages Traffic Manager—The unusual transportation problems this season have prompted the Vesper-Buick Auto Co., St. Louis, Mo., to add to its staff a traffic manager, E. N. Naylor, for many years with the Chicago & Alton Railway. This appointment is a new office for a distributor, as far as St. Louis is concerned. Mr. Naylor will assist in getting cars from the factory and look after the distribution to the southwest. The St. Louis Studebaker shipped practically a steamboat load of Studebaker cars to

southern river points one week. They will reach local distributors at Cairo, Ill., Memphis, Tenn., Vicksburg, Miss., and New Orleans, La.

Federal Rubber Co.—The Federal Rubber Co. has declared a quarterly dividend of 1½ per cent on first preferred, payable April 1 to stock of record March 17.

Wheeler-Schebler in Michigan—The Wheeler-Schebler Carburetor Co. of Indianapolis and Detroit has been incorporated for \$1,000,000 in the state of Michigan.

Miller Plans Texas Plant—The H. A. Miller Mfg. Co., Los Angeles, Cal., is planning the erection of a plant at El Paso, Tex., for the manufacture of carburetors. It will cost \$325,000.

Ajax Doubles Capacity—The Ajax Rubber Co., Trenton, N. J. is equipping its new plant for early operation at full capacity. It will have an output of 3400 tires a day, double the former capacity.

New Parts Company Formed—The Columbia Auto Parts Co. has been formed at Cleveland, Ohio, with a capital of \$850,000. Incorporators include W. W. Stephens, J. Stephens, J. Pindras, F. Koore, Jr., and A. A. Stephens.

Keystone Tire & Rubber Co.—The Keystone Tire & Rubber Co. has declared a dividend of 2 per cent, with an additional ½ of 1 per cent on preferred, a regular quarterly of 3 per cent on common, payable April 2 to stock of record March 23.

Canadians to Build More Aeroplanes—The Canadian Aeroplanes, Ltd., has purchased 9½ acres for a factory, paying \$145,000. It will erect a plant of brick and steel at a cost of \$200,000, which will turn out twenty aeroplanes a day, and cover 4½ acres.

Promotions at Puritan Machine Co.—The Puritan Machine Co. has promoted Paul Gersick, formerly foreman of stock, to be general superintendent of the plant. Charles H. Dawson has been appointed assistant service manager.

Saxon Starts Boundry Trail Blaze—The Saxon Motor Car Co. has started a Saxon four from Washington, D. C., to Richmond, Va., where it will commence a trip to establish a motor trail and boundary around the rim of the United States.

Chevrolet Now Occupies 56 Acres—The seven factories of the Chevrolet Motor Co. in the United States and Canada cover 2,474,097 sq. ft. of floor space, an area equivalent to 56½ acres, and a minimum production for 1917 has been set at 150,000 cars. The plants include fifty-six buildings situated at important points from the Atlantic to Pacific coasts.

Dealers Honor W. C. Leland—The dealer organization of the Cadillac Motor Car Co. has expressed its regard for Wilfred C. Leland, vice-president and general manager of the Cadillac company, by presenting him with a gold and silver tablet bearing the inscription "To Wilfred Chester Leland in recognition of his conception of the high speed efficiency V-type engine and its application to the motor car. From Cadillac Old Guard."

Cadillac Banquet for Students—Students and student graduates of the Cadillac School of Applied Mechanics, 135, were given a banquet at the annual school meeting by the Cadillac Motor Car Co. Cash prizes amounting to \$175 were given for efficiency. About forty foremen who cooperate with the school were also in attendance. The school was founded ten years ago to train young men in the theory and practice of mechanics

as applied to the motor car. Many of the graduates now hold positions with the Cadillac company.

Hollan Mfg. Co. Chicago Name—The Hollan Mfg. Co., of Detroit, has changed its firm name to the Motors Metal Mfg. Co.

Springfield Body Corp.—The Springfield Body Corp. has declared a 2 per cent quarterly dividend, payable April 2 to stock of record March 21.

Pierce-Arrow Motor Car Co.—The Pierce-Arrow Motor Car Co. has declared a quarterly dividend of 2 per cent on preferred, payable April 2 to stock of record March 15.

Shuert With Aason—R. G. Shuert has been appointed factory manager for the Aason Motor Truck Co., Detroit. Mr. Shuert was formerly production engineer for the Indiana Truck Co., Marion, Ind.

To Make 1000 Cars in March—The Franklin Automobile Co. will make 1000 cars during the month of March. The company has increased its floor space acreage 150 per cent within the last year, which allows for this production.

Norwood Goodrich Secretary—Guy E. Norwood has been elected secretary of the B. F. Goodrich Co. Mr. Norwood succeeds C. B. Raymond, who, with W. A. Means, former treasurer, becomes a vice-president. Mr. Norwood has been with the company since 1901.

Chambers Leaves Maxwell Sales—W. D. Chambers, assistant manager of the Maxwell Motor Sales Corp. of Philadelphia has resigned to join the R. E. Loughney Motor Co., Pittsburgh, distributor of the Stutz and Reo in Western Pennsylvania. Mr. Chambers has an interest in the company and will act as manager of sales.

Beck Joins Comet Company—G. Vernon Beck has been appointed general sales manager for the Comet Automobile Co., Decatur, Ill. Mr. Beck was formerly district manager for the Chalmers Motor Co., later western sales manager for the Detroit Motor Car Co. and resigned as sales manager for the Elgin to take charge of Comet sales.

Fuller Expanding—The Fuller & Sons Mfg. Co., of Kalamazoo, Mich., will add 40,000 sq. ft. of floor space to its plant. The company, which makes the Fuller transmission, is now working 300 persons daily and has attained a maximum production of \$1,500,000 annually. The output for January and February of this year was double the output for the corresponding period of last year.

Racine Tire to Expand—The Racine Auto Tire Co., Racine, Wis., will award contracts about April 1 for the erection and equipment of a complete new tire and tube manufacturing plant on a 5-acre site purchased last fall. The plans will call for an investment of about \$100,000. The buildings will be of reinforced concrete, steel and brick, thoroughly fireproof, and when completed will enable the company to more than triple its output.

Gilson Forms Company—James W. Gilson, formerly an official of the Mitchell-Lewis Motor Co., Racine, Wis., now the Mitchell Motors Co., has organized the Western Coil Co. to manufacture a varied line of electrical appliances for motor cars and other purposes. The company will start operations in Racine about April 15. A temporary factory was established in Chicago some time ago. Between seventy-five and 100 employees will be required when this is moved to Racine.

A-B-C Licenses Three-Way Drive—The A-B-C Starter Co. of Detroit has granted a license to its three-way generator drive to the Brush Engineering Association of Detroit. The license covers the application of this drive to motor car engines and motor cars built by clients of the association. The drive is the invention of Alexander Churchward, vice-president and engineer of the

A-B-C company, and is used exclusively in the design of the A-B-C starting and lighting system for the Ford car.

Will Build a \$1,000,000 Addition—The Firestone Tire & Rubber Co. will build a \$1,000,000 annex to its plant this year.

Willard Almost at 1000 Mark—Additions during the last month to the Willard service stations have brought the number to 925. The goal set by the company is 1000.

New Harroun Dealer—The Coffin Motor Car Co., headed by Bert Coffin, has been appointed Harroun distributor for Indianapolis and Central Indiana. Mr. Coffin was a former All-America Football star.

Edwards Joins Parker Rust Proof—George D. Edwards, Jr., formerly with the Hayes Mfg. Co., and more recently with the Springfield Metal Body Co., has joined the Parker Rust Proof Co. of America as purchasing agent.

Peerless Additions Are Completed—The Peerless Motor Car Co., Cleveland, Ohio, is preparing to move its passenger car department into the new group of factory buildings, which afford about 500,000 ft. additional floor space.

Chevrolet Leases Another Building—The Chevrolet Motor Co. has leased a nine-story building in New York for a long term of years at a rental of more than \$50,000 a year and will take possession of it in October. The building will be occupied as a sales-room and for executive offices.

To Distribute Nash in Northwest—The Chilcott-Nash Co., Seattle, Wash., has been formed to distribute the products of the Nash Motor Co. in Oregon, Washington, Northern Idaho, Western Montana and Alaska. W. K. Chilcott, who has just resigned as sales manager of the General Motors Truck Co., is head of the new organization.

"Angiers," U. S. A. Is Building—"Angiers," U. S. A., Streator, Ill., is building a plant which will give five times the present capacity. The concern makes various types of axles and sells exclusively to jobbers and dealers in orphan car parts. It manufactures any kind of parts for the motor car, made of drawn steel, either in tubing or in solid in addition to the regular products.

Wilson Body to Expand—The Wilson Body Co., Detroit, has completed negotiations for the purchase of 33 acres in Bay City, and will build a plant for the manufacture of wood stock only on the outset. The company will employ 400 more workers and increase the

floor space by 150,000 to 160,000 sq. ft. by the addition, which will give a capacity of from 800 to 900 motor car bodies a day.

Bethlehem Motors at Allentown—The general offices and factory of the Bethlehem Motor Corp. are at Allentown, Pa., instead of at Scranton, Pa., as noted in a recent item.

Redden Truck Consolidates Offices—The New York and Detroit offices of the Redden Motor Truck Co., Inc., have been consolidated with the new Chicago office of the company.

Menominee to Enlarge Factory—The Menominee Motor Truck Co. will enlarge its factory to allow a capacity for 650 trucks per year, which is three times the present quantity produced.

Hare Leaves Maxwell Sales—Herbert T. Hare has resigned as advertising manager of the Maxwell Motor Sales Corp. branch in Philadelphia and has joined the Packard Motor Car Co. of Philadelphia.

Elgin to Enlarge Factory—The Elgin Motor Car Corp., Chicago, is planning additional factory buildings which will give the company three times the present space and will provide for an annual output of between 20,000 and 25,000 cars.

Dickey Joins Motor-Meter—H. L. Dickey has become general sales manager of the Moto-Meter Co., Inc., Long Island City, N. Y. For the last three years Mr. Dickey has been general manager of the Findeisen & Kropf Mfg. Co., New York.

Kelsey Earns 6.48 Per Cent—The Kelsey Wheel Co. in its first annual report for the year ended Dec. 31 shows gross sales of \$8,178,921 and net profits of \$558,639, which is equivalent to 6.48 per cent on the \$10,000,000 of common stock. Assets are \$13,906,674.

Needham Leaves Bailey—Maurice Needham has resigned as general manager and treasurer of the Bailey Non-Stall Differential Corp., Chicago, to become associated with the Barrett-Cravens Co., manufacturer of the Barrett Multi-truck, time clocks and other factory equipment, Chicago. Mr. Needham was formerly advertising manager of the Thomas B. Jeffery Co., now the Nash Motors Co., Kenosha, Wis.

Ranier Places Foreign Agencies—The Ranier Motor Corp., New York, has placed foreign agencies in five countries, namely, Chipman, Ltd., of Sydney and Auckland, covering Australia and New Zealand; Bergens Automobile Co. of Christiania, Norway;



SHOWS AT DEPARTMENT STORE EXHIBITION—The illustration is of the exhibit made by Adams & Elting Co. at the accessory show held by Rothschild & Co., Chicago, last week